# Microanalysis of retirement behavior in the Russian Federation

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## Introduction

Population ageing process has become the most important tendency in the world in recent decades. Increasing share of the elderly in total population, the increase in life expectancy and decline in fertility, resulting in the reduction of labor force and increase in public finance beneficiaries, represents a real challenge for the economic performance, financial stability of social and pension systems of different countries in the world.

Political attention to the problems of the population ageing was given in the 1980-1990s. Number of the studies was devoted to analysis of the consequences of an ageing process to the economy, financial systems and labor market. There was also a necessity to evaluate the responsiveness of the pensioners to different policy measures aiming at the change of pensioner's behavior in a way that less detrimental to society, economy and financial stability of the pension system. That's why better understanding of retirement behavior, its determinants was helpful in meeting these policy challenges. Thus researches have started to be interested in the study of older workers labor supply and their retirement decision.

Retirement is important decision in life-cycle labor supply. There are a number of theoretical models of individual's retirement decision which vary from simple one-period work/leisure choice model to sophisticated dynamic optimization problem. Most studies focused primarily on ex-post analysis of the observed retirement behavior using a work-leisure model or a life cycle labor supply model. Typically, actual retirement decisions have been treated as dependent variable and various social, economic and others factors have been shown to play an important role in this decision. So the empirical literature shed light on the retirement behavior of the elderly as well as on its possible changes due to different public policy measures.

Russia is a country that faces also the consequences of the process of global ageing. Meanwhile, it current pension system characterizes already by inefficiency. It implies bigger part of federal budget financing (as a share of GDP) and higher rate of pension contributions than OECD countries whereas it affords lower replacement rate than in countries OECD members. More than that, long-term sustainability of Russian pension system is further jeopardized by the process of ageing of the population.

In this study it's showed that the only way to deal with the problem of population ageing and threat of financial sustainability of Russian pension system is increase in retirement age. However, this measure does not have political approval and is very unpopular among Russian population. So the Russian government should be really careful in its realization and envisage its possible influence on the retirement behavior of individuals and try to mitigate them. Thus, it is worthwhile to analyze the retirement behavior of individuals and to find out which factors are related to retirement decision and to see which types of workers would be impacted most by

increase in retirement age. Understanding these factors will help to create conditions of easier adaptation for population to necessary retirement age increase.

This paper presents the results of econometric analysis of retirement behavior of Russian pensioners. The aim of the investigation is determination of those factors that affect the retirement decision of men and women in Russia. Their understanding can be helpful for pension reform realization. This analysis is performed on the basis of data from the Russian Longitudinal Monitoring Survey. The data are taken from the $15^{th}$ to $19^{th}$ waves of survey that correspond to 2005-2010 period of time.

First of all this paper gives a survey of retirement literature, then describes the pension system in the Russian federation and particularities of retirement behaviour of Russian pensioners, after that it presents basic hypothesis of the analysis and, finally, concludes with econometric results and their interpretation.

## Chapter 1. Retirement behavior literature: its development and overview.

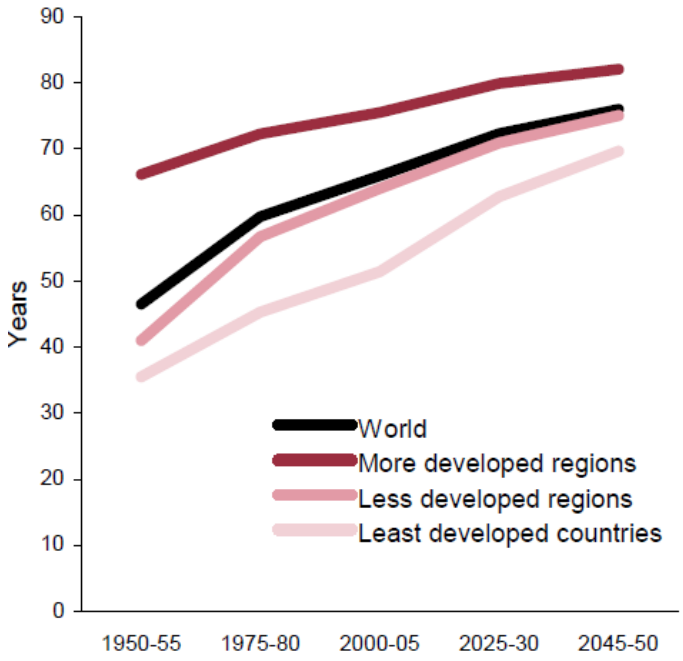
The process of population ageing is a tendency of increase in the share of elderly population in the total population structure. It is a by-product of the demographic transition from high levels of mortality and fertility to the lower ones. It is occurring all over the world, but is mostly advanced in developed countries.

### 1.1 The process of population ageing. Its causes, tendencies and implications for the economy and society.

Due to decline in mortality rates and medicine progress, the world's population is living longer now. Over the last five decades, life expectancy at birth increased globally by almost 20 years, from 46.5 years in 1950-55 to 66 years in 2000-2005 and, according to the projections of UN, will continue to increase further in all parts of the world (see Figure 1).

Figure 1

Life expectancy at the birth: world and development regions




Source: UN, World population ageing 1950-2050, p.6

Another factor that generously contributes to ongoing demographic change is a decline in fertility rates (see Table 1). Actually, only this tendency on its own might be responsible for population ageing. That's why unlikelihood of the fertility rate increase to the previous level, gives to the population ageing process irreversible character and long-term duration.

Table 1

Fertility rates

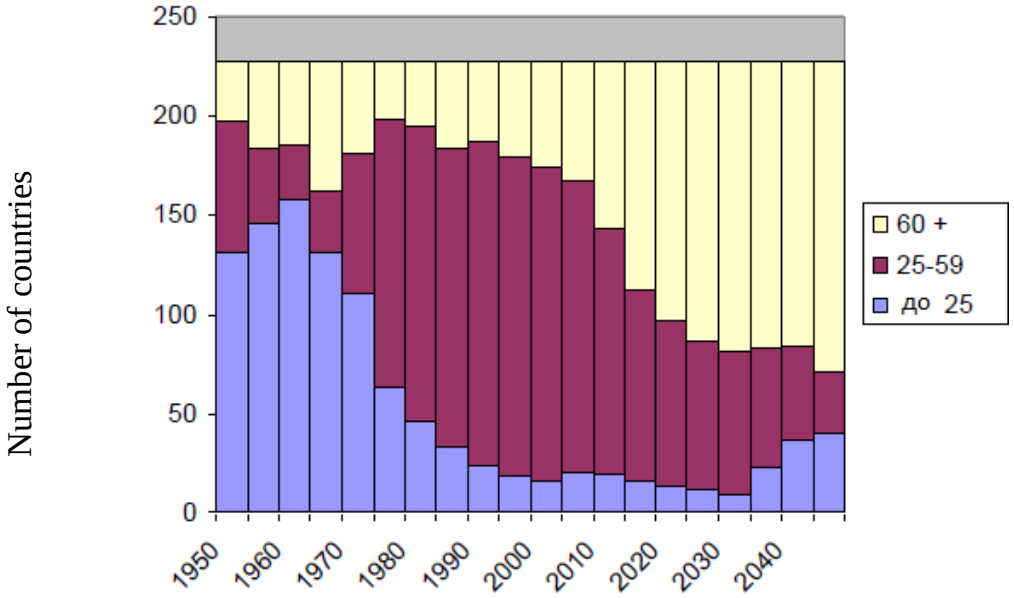
| | 1960 | 1980 | 2000 | 2008 |
|---|---|---|---|---|
| East Asia | 5,21 | 3 | 1,96 | 1,89 |
| Europe and Central Asia | 2,75 | 2,16 | 1,55 | 1,7 |
| Latin America | 5,97 | 4,2 | 2,65 | 2,23 |
| Middle East and North Africa | 6,92 | 6,27 | 3,25 | 2,77 |
| North America | 3,67 | 1,83 | 2 | 2,05 |
| South Africa | 6,04 | 5,06 | 3,45 | 2,88 |
| Sub-Saharan Africa | 6,67 | 6,7 | 5,59 | 5,13 |

Source: The World Bank

As a consequence, the older population grows at a considerable faster rate (2,6%) than that of the world's total population (1,1%). In absolute terms, the number of older persons has tripled over the last 50 years and will more than triple again over the next 50 years (UN, World Population Ageing). So the number of countries facing to the population ageing process continues to grow further (see Figure 2)

Figure 2

Distribution of countries by phase in age transition*




*countries classified based on age group with greatest increase in population

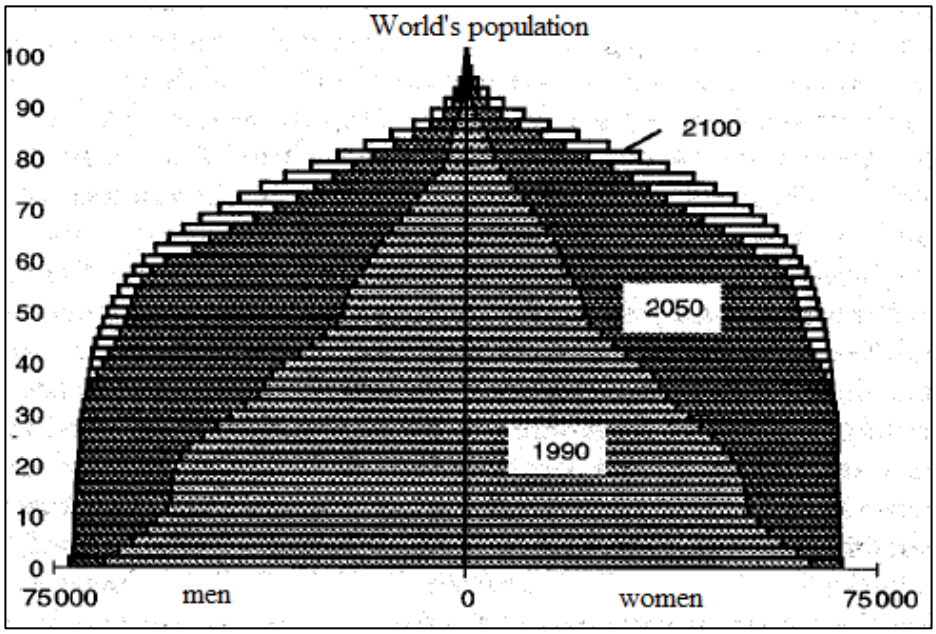
Source: Lee R., Mason A., Cotlear D., 2010

As a result population ageing leads to shift of the young-old balance throughout the world. In the more developed regions, the proportion of older persons already exceeds that of children, and by 2050 it is expected to be twice as much as that of children (UN, World population Ageing).

Extent and rapidity of the demographic change can be vividly traced in the population pyramid (see Figure 3). In 1990, world population essentially was a pyramid. In 2050, it will have the shape of a bell, and then, according to the UN, stabilize to 2100.

Figure 3

World population pyramid




Source: Axel Borsch-Supan, 2004

Thus the median age of population rose from 23.9 years in 1950 to 26.8 years in 2000 and is forecasted to rise to 37,8 in 2050. In developed countries the situation is even worse. The corresponding figures for them are 29 years for 1950, 37.3 years for 2000 and 45,5 years for 2050 (David N. Weil, 2006).

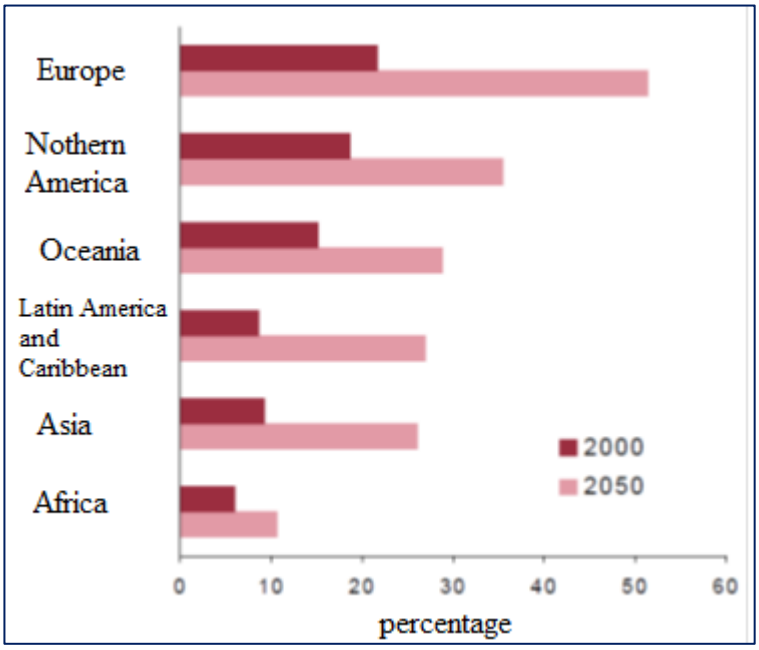
Increases in life expectancy have not, however, resulted in increase in the average number of years people spend in the workforce. The world's population is retiring earlier now. Historic US data gathered by Ransom and Sutch (1986) indicates that around 60% of all men aged 65 and over were working in 1900. This ratio declined to 50% in 1950, fell below 40% in 1960 and continued to reduce in most European countries and the USA in further decades. Labor force participation rates of older Americans began to increase only in 2000[s]. According to the Bureau of labor statistics, labor force participation rate for those aged 65 to 69 increased from 24,5% to 28,3% in 2000-2005 (Retirement decision report to congressional committees). As a consequence, current pensioners are spending up to a third of their lifetimes relying on public and private retirement benefits – the fact that is quite unfavorable for public finance and financial solvency of pension systems.

All factors together significantly increases the elderly dependence ratio – the estimated number of people aged 65 and over in relation to the number of people aged 15-64 (see Table 2),

and creates a situation where bigger number of potential beneficiaries of health and pension funds are supported by a relatively smaller number of potential contributors. These trends threaten the financial stability of national pays-as-you-go social security systems (World Bank, 1994) and represent a major challenge for government in all countries around the world.

Table 2

Old-age dependency ratio: major areas, 2000 and 2050




Source: UN

Threat to long-term financial stability of pension system is not only implication of population ageing process. Actually it affects a lot more aspects of individual's life. In economic sphere it exerts an influence on:

- *economic growth.*

Taking into account the fact that pensioners have less savings and work less than people in working age, researchers concluded that population ageing would be accompanied with decline in labor resources, investments, and then in capital resources too, that will negatively affect economic development (Peterson, 1999; Lisenkova *et al*, 2008).

However this finding is overstated because it doesn't take into account change in behavior of individuals and politicians in response to this demographic change (Bloom *et al*, 2010). For example, government can change rules of migration to mitigate the scope of reduction in work force. Also, due to smaller number of children, each of them can receive better education, and it means, will have better quality of human capital etc. Such measures can moderate negative influence of population ageing on economic growth. That's why the exact scope of influence depends on public policy and individual's behavior in particular country.

- *Dynamic and volume of savings and investments.*

Here it is the type of pension system that matters. Usually, countries with funded pension system where pension savings of individuals accumulated during quite long period of time have bigger level of savings and investments than countries with Pay-As-You-Go system where pension contributions of current employers go to pension provision of current pensioners. That's why in countries with funded pension system financial markets have more developed financial organization and bigger capitalization (see Table 3).

Table 3

Capital markets in countries with Pay-as-You-Go and Funded pension system

| | | **Pay-as-you-go systems** | | | **Partially funded systems** | | |
|---|---|---|---|---|---|---|---|
| **Factor** | Year | France | Germany | Italy | Netherlands | UK | USA |
| Stock market capitalization (% of GDP) | **1995** | **32,6** | **23,9** | **19,3** | **72,1** | **121,6** | **95,2** |
| | **1998** | **68,1** | **50,9** | **47,5** | **153,5** | **168,2** | **144,9** |
| | **2000** | **111,8** | **67,6** | **72,3** | **174,3** | **183,8** | **153,3** |
| Assets held by institutional investors (% of GDP) | **1995** | **77,7** | **45,3** | **32** | **154,5** | **164** | **151,9** |
| | **1998** | **107,3** | **66,1** | **79,6** | **193,2** | **203,6** | **192** |
| Assets held by pension funds (% of TA of institutional investors) | **1998** | **-** | **5** | **5** | **58** | **37** | **37** |
| Assets held by pension funds (billion USD) | **1995** | **-** | **65,3** | **39** | **352,1** | **759,7** | **4259,5** |
| | **1998** | **-** | **69,5** | **37,4** | **323** | **1136,5** | **7161,6** |
| Pension fund investment (% of household wealth) | **1995** | **1,8** | **5,6** | **0,8** | **35,5** | **22,3** | **23,4** |
| | **2000** | **1,5** | **5,2** | **1,2** | **37,7** | **22,1** | **23,8** |

Source: Axel Borsch-Supan, 2004

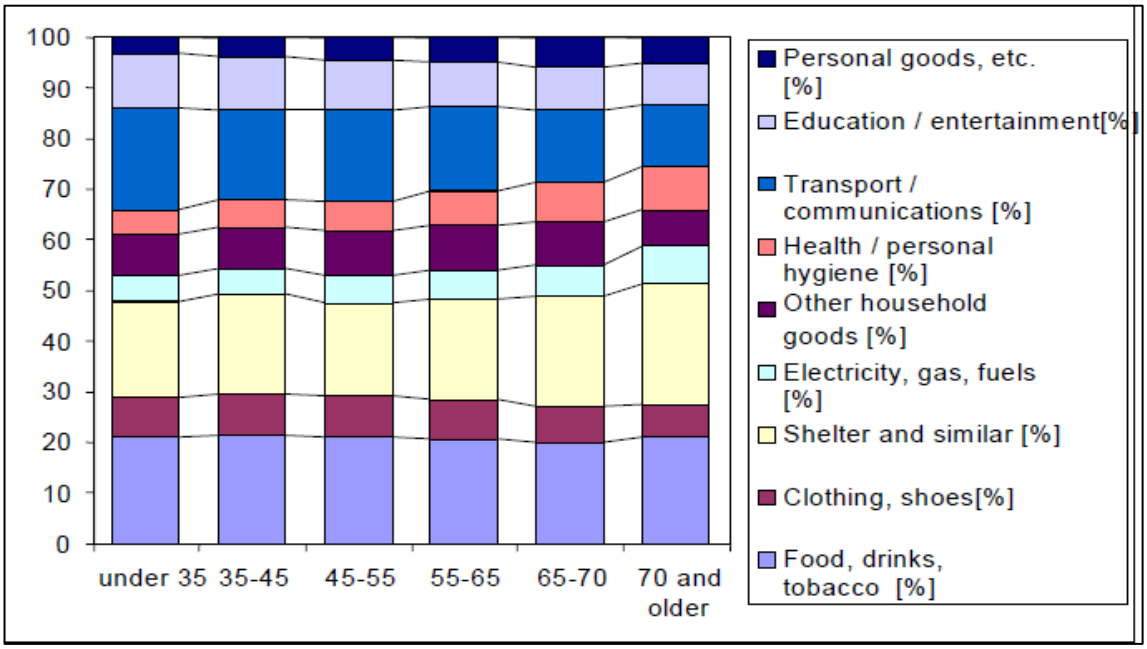
So countries with funded pension system will continue to observe the development of capital market, the rise of capitalization and corporate governance practice improvement. Countries with PAYG systems, facing with financial solvency problem of their pension systems, will be completed with funded component or characterized with increase in private savings (that will be complement to public pension size ensured by the system faced with substantial rise of old-dependency ratio). Thus savings for pension either public (managed by institutional investors and pension funds) or private will push the development of financial markets and give a rise to investments and productivity in economy.

- *Consumption structure.*

Change in consumption structure happens because needs and preferences of the elderly and of the youth are different. For example, according to German study (1983), the share of expenditures on transport, clothing and communication are reducing with age, while expenses on medicine and accommodation are increasing (see Figure 4).

Figure 4

Age-specific distribution of consumer spending across different group of goods




Source: Axel Borsch-Supan, 2004

So, global ageing will lead to shifts in consumption structure towards the bigger consumption of products that are necessary for the elderly. Moreover, changing product demand will precipitate shifts in sectoral labor demand and hence shifts in labor force structure.

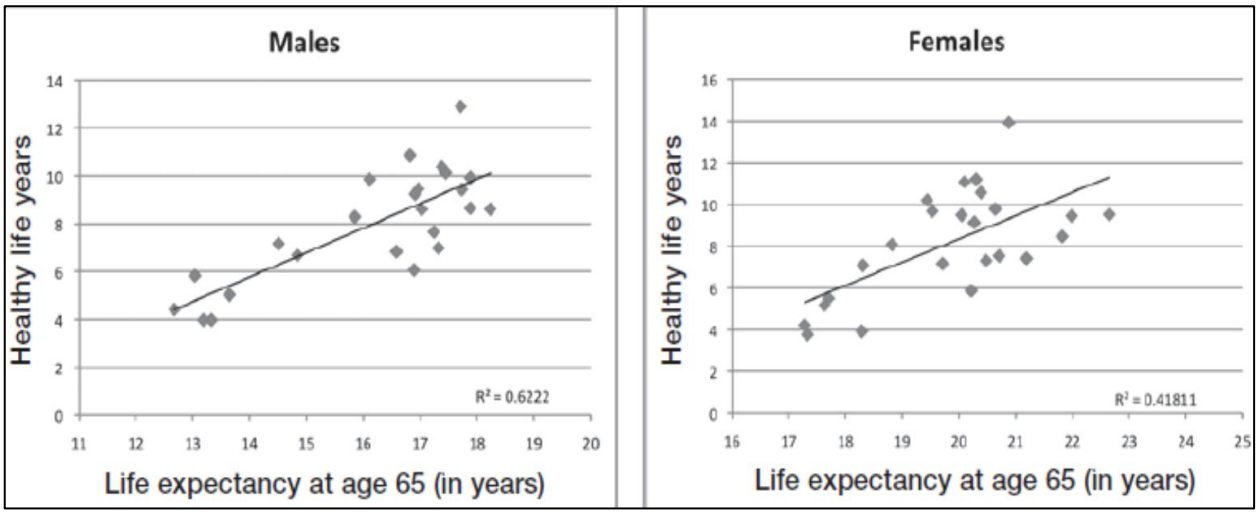
- *labor market situation.*

Population ageing leads to increase in the share of the elderly and that's why reduces the size of work force. Meanwhile, the major reason of demographic change is decline in fertility rate that from the labor force participation point of view gives to women a possibility to work those years that were previously devoted to child's care. However, this source of work force rise is not so big, especially in developed countries, where fertility rate is already below 2.

According to Robine J-M., Saito Y., Jagger C. (2009) life expectancy is increasing together with the increase in expectancy of healthy life duration (see Figure 5). This fact means that some part of the elderly that previously would like to work after achievement of retirement age can do it now because they don't have health limitations. So, for example, data for USA showed the increase of the elderly participation rate in labor force during recent years. Thus total result in the change of labor force is indefinite and depends on the scope of these different tendencies in a given country.

Figure 5

Correlation between life expectancy at age 65 and number of years of healthy life in EU




Source: Robine J-M., Saito Y., Jagger C., 2009

Also labor market will be affected by change in consumption structure. As population ageing will lead to increase in the demand for medicine services and reduction in the demand for school/transport/clothes, significant part of the population will be forced to change their occupation. In the study of Axel Borsch-Supan (2004), such estimation for Germany will correspond to 7% increase in medicine employment, 5% decrease in transport employment. While altogether, 18% of employees will be forced to change their field of activity.

- *public policy*

Public policy changed, is changing and will be change to face the challenge of population ageing. This process involve not only the change in the structure of government expenditures but also a set of measures elaborating to mitigate the scope of adverse influence of the process of population ageing on different spheres of individual's life.

In social sphere population ageing reflects in

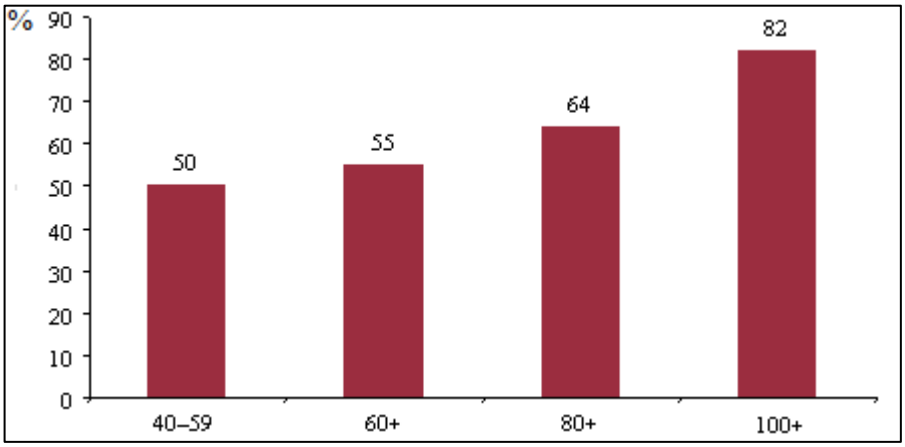
- *family composition.*

The elderly population is also ageing. The number of the individuals older than 80 is increasing with faster rate than elderly population that older than 60. It is increasing by 3,9% per year (UN). By 2050, two out of ten elderly individuals will be older than 80. This creates a necessity to care about these individuals because they need it more than anyone else. In the family context it impose new caregiving responsibilities on it members. Besides government should develop special institutions for those individuals who don't have relatives that can take care of them.

More than that, women predominate in elderly population because they have longer life expectancy (see Figure 6). That's why the loneliness of women population in declining years is another social problem that can have some implication for society and require appropriate public support.

Figure 6

Percent share of women in world's population in dependence of age.




Source: UN

- *migration tendencies.*

In some counties weakening of migration policy is a source of mitigate\ion of negative impact of population ageing on labor situation and economic performance. But the wave of the migrants might create social problems and have political implication that we don't specify in this study.

In political sphere the process of global ageing changes the electorate's structure and its political activity and thus it affects election results. Some examples of this influence in case of Russia are given in the chapter 2.

Nevertheless, the most direct and evident consequence of population ageing is impact of increase in old-age dependency ratio on financial solvency of pension system. To face this challenge most countries are forced to reorganize principles of pension provision in order to ensure its financial stability. Some of them are just changes in the rules of pension provision (for instance, increase in pension age), some of them – appropriate incentives for the elderly to change voluntarily their retirement behavior in a way that is beneficial for public finance.

Anyway politicians need to create incentives that allow to mitigate the scope of the increase in the number of beneficiaries of the pension provision and the scope of decline in the number of contributors to it. That's why better understanding of retirement behavior, its determinants is of help in meeting these policy challenges. Therefore researches have started to be interested in the study of older workers labor supply and their retirement decision.

### 1.2 The models of retirement behavior. A review of theoretical literature.

Retirement is important decision in life-cycle labor supply. However for it empirical analysis a theoretical framework that describes the economic principles behind individual labor supply choices is needed. There are a number of theoretical models of individual's retirement decision which vary from simple one-period work/leisure choice model to sophisticated dynamic optimization problem. These models have proven to answer many of the research questions by incorporating the full choice process, the structure of retirement programmes, intertemporal preferences and uncertainties.

We begin with basic and simple model of an individual's work decision which was the starting point for theoretical modeling and reference for nearly all early research before the late 1970s. Then we trace the development of the modeling of retirement behavior during further decades. Generally, models are becoming more sophisticated due to incorporation of the previous research findings, characteristics of reality and availability of the data.

*The basic work-leisure choice model*

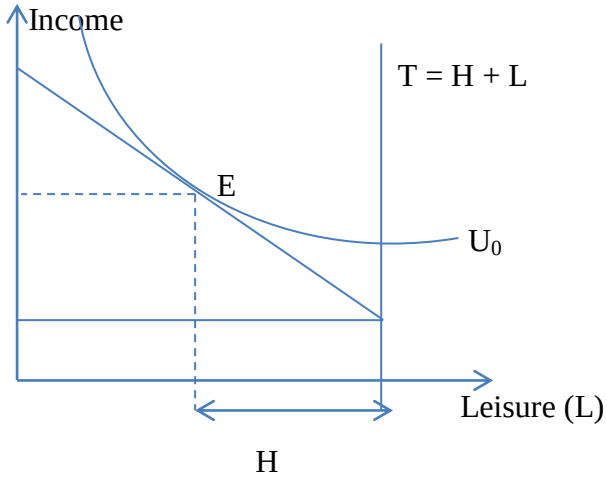
The most simple and fundamental model is a work/leisure choice model which deals with the decision of the individual to allocate total available time (T) between two competing uses, the amount of time devoted to work (H) and the amount of time devoted to the leisure (L). In this model the person's level of satisfaction (level of utility) depends solely on the consumption of goods (X) and the amount of the leisure that he enjoys. If income can always be earned at a wage rate of w per hour worked (for example), then the total income available to the individual consists of total earning (wH) and any nonwage income (V). Thus the person's attainable level of utility is limited by the budget constraint $pX \leq w(T-L) + V$.

$$\begin{cases} \text{Max } U = U(X, L) \\ \text{s.t. } pX \leq w(T-L) + V. \end{cases}$$

In this simple model the individual's choice of how much time to work is determined not only by the budget constraint but also depends on the person's taste and preferences for leisure and consumption (see Figure 7). The solution to the problem is given by the worker's labor supply function $H = H(p, w, V)$. In the first stage the person decides whether to work at all. At the second stage he determines how many hours to work.

Figure 7

Graphical representation of basic work/leisure choice model




This model implies that an increase in income in any period *t* results in less hours of works in that period (leisure is a normal good). And a change in the wage has two effects: the increased buying power implies that more leisure should be consumed, but an increase in the wage makes leisure relatively more expensive. The net effect is ambiguous.

This model contains the essential features of the economic theory of work/leisure choice and serves as a basis for majority of labor supply research and more sophisticated model development.

*A simple lifetime retirement model.*

The easiest and most primitive retirement model is a straightforward application of the single-period work/leisure choice model described above. It treats each year in the individual's lifetime independently and implies that retirement decision affects one year at a time (Lazear, 1989). So the worker's lifetime utility function can be written as:

$$U = U(L_1, X_1, L_2, X_2, ..., L_t, X_t)$$

In order to convert it to the standard one-period work/leisure framework, it's sufficient to write the utility function as:

$$U = U_1(L_1, X_1) + U_2(L_2, X_2) + ... + U_t(L_t, X_t)$$

and ensure that no borrowing or lending occurs. This permits to treat each year in the individual's lifetime completely separately. In other words, the analysis considered a one period optimization problem, in which the budget constraint and utility function include present consumption, income and leisure. By maximizing his one-period utility individual determines the number of hours devoted to work ($H_t$) in each period. Retirement occurs when an older person's choice of the number of hours devoted to leisure equals the full amount of available time.

Nearly all of the early retirement studies tried to explain labor participation trends for American male workers by this single period work-leisure model. Up to that point, retirement was regarded as involuntary and only since the late 1970s it started to be considered as voluntary

decision of individual who compares the subjective value of the leisure and actual size of his labor compensation and take decision on the basis of this comparison.

Altogether, these studies tested whether the expansion of the social security programs during the post-World War II period might have prompted (due to the income effect) the decline in the labor-force participation among men aged 65 and over. They used retirement models in which the value of annual Social security benefit and private pensions enter as a key explanatory factor of the retirement decision.

In one of the earliest studies Boskin (Boskin, 1977) found that the value of the current annual Social Security benefit had pronounced effect on the decision to retire. A 1000 $ increase in annual size of social security benefits was associated with an increase in the probability of retiring from 0,075 to 0,16. In general, the impact of health status, financial incentives, personal and job's characteristics, local labor market conditions on labor-force participation decision was investigated within the context of this model (Quinn, 1977; Munell, 1974; Burtless and Hausman, 1980).

However this model allowed to explain only part of retirement behavior with the influence of Social Security incentives, heath conditions and etc. Feldstein (1974) showed that current income levels cannot fully explain retirement patterns, future income opportunities appear to be important as well. Labor supply decisions may be based on preferences for future consumption and leisure, and determined by future income levels and retirement opportunities. If working an additional year leads to a substantional higher retirement benefits one year later, than postponing the retirement is attractive. But here nothing is said about the relations among $U_t$ and $U_{t-1}$. Burkhauser (1976) recognized that this simplification is misleading. In the data that he examined, he observed that the pension value associated with early retirement often exceed that for normal ages of retirement and this findings allowed to him to understand and explain the phenomenon of early retirement. More than that, in this model there is no specification for the possibility to return to the labor force in the subsequent periods.

Since future opportunities and preferences may influence present retirement decision, the analysis should be states in a life-cycle context.

*Multi-period models*

The major problem with one-period model of retirement is the assumption of intertemporal separability which implies that wages at other periods of work life are irrelevant for the retirement decision. They also imply that only the current pension level affects the worker's retirement decision. Thus taking into account the interdependence of the choices in the different time periods we can better model individual behavior. In models of this type individual should

formulate a long-term plan for work and consumption that maximizes satisfaction over the expected lifetime.

Attempt to develop labor supply model that fully incorporates life cycle idea was reflected in the simple reduced form model that included detailed information on life cycle income patterns. For example, Fields and Mitchell (1984) used a linear model to regress the retirement age on current and future streams of earnings, private pensions and social security benefits, where the structure of pension plans was explicitly incorporated. In choosing a retirement age, individuals weigh the monetary advantage to be gained by postponing retirement another year and the value of foregone retirement leisure. Individuals compare these values and choose their preferred age of retirement.

An important feature of this model is the fact that it assumes that all changes in income streams, including Social Security are fully anticipated by workers. The idea that the time dependent composition of early retirement programs determines labor participation behavior led to more attention for structural models. Although many models were already structural in the sense that they captured multiple retirement opportunities and constraints, the retirement literature became more concerned with structural representation of labor supply.

*Structural models*

Structural models can potentially incorporate much of the detail of individual's lifecycle budget constraints. These models allow economists to measure the specific effects of numerous features of social security and pension plans rather than restricting their financial incentives to operate through one or two summary measures, such as monthly benefit amount or a coverage indicator.

One of the best examples of this approach is the structural and empirical retirement model by Gustman and Steinmeier (1986) which is based on the optimization of life time utility determined by consumption and leisure. In this model preferences for income and leisure gradually shift in favor of leisure as individual age. An important feature of this model is the recognition that retirement sometimes occurs gradually via the transformation from full to part-time work. Moreover the model allows preferences to vary both across individuals and over time with age, health and by cohort. The model allowed for the prediction of labor supply under policy changes that affect the full compensation profile. It has been one of the first models that was able to explain the U.S. retirement peaks at age 62 and 65. As in case of the Fields-Mitchell research, this model also assumes that all changes in income streams from various sources are foreseen.

This type of models was a big step towards the structural analysis of retirement decision, but was not flexible enough for general applications.

The major drawback of structural multi-period models is inability to include in the model uncertainty about real future values. Diamond and Hausman (1984) argued that unexpected events can seriously disrupt the retirement plans. In order to control for uncertainty about the health conditions and employment opportunities, they estimated a hazard model in which uncertainty is a part of the basic decision process. In the review of the literature Lazear (1986) recognized also the need for structural retirement models that would also include uncertainty about environment and the values of other explanatory factors.

With the development of the study of older workers retirement models have become increasingly dynamic.

*Dynamic models*

Early models were usually static in the sense that labor-force status was determined by a set of causal factors. Individual accurately foreseen these factors and make lifetime work plans that are subsequently carried out without change. The possible changes of the causal factors over the time were not captured by these models. Dynamic models allowed changes of explanatory factors over time. More particularly, the sequencing and timing of these changes is held to be critical to the behavior being investigated. So retirement was more and more considered as a dynamic process where plans change when new information concerning causal factors becomes available to individual.

Starting with the work of Rust (1989), dynamic programming models met this challenge. Rust modeled the formation and revision of individual's expectation. He derived the retirement behavior of older male worker as a solution to a stochastic dynamic programming problem. This model was computed numerically, applying "the nested fixed point" algorithm and supercomputer Cray-2.

In Rust model the worker's objective is to maximize expected discounted utility over his remaining lifetime. This maximization must be based on expectation about longevity, health, marital status, income and wealth – all determinants of retirement whose future values cannot be known with certainty when long-term plans are formulated. At the beginning of each year, the individual has 2 choices: retire now and derive utility from future retirement benefits, or work for one year and derive utility from income while working during this year and retaining the option to choose the best of retirement or work in the next period. By doing so, each future utility mast be discounted by the probability of realizing it (the probability of surviving to year $\tau$ given that the worker alive in year $t$). Thus, at each time period he chooses how much to

consume and whether to work full-time, part-time, or exit the labor force. Thus the full model simultaneously explains his employment status, consumption expenditures and the timing of the first application for Social security benefits. The worker formulates his utility-maximising plan for work and consumption and routinely revises it as he ages and acquires additional information.

The model accounts for the sequential nature of the retirement decision problem, and the role of expectations of uncertain future variables such as the worker's future lifespan, health status, marital and family status, employment status, as well as earnings from employment, assets, and social security retirement, disability and medicare payments. Moreover, this approach assumes substantial rationality on the part of individuals and a predilection for carrying out long-term plans.

Dynamic models can potentially incorporate enormous amounts of details about individual and given the power of modern computers, are limited only by data availability and researcher's ingenuity and diligence.

*Option value analysis*

However, in order to avoid these computational complexities, Stock and Wise (1990) reduced their dynamic programming to option value models. This type of models focuses on the fact that at any point in time the decision to continue working maintains an option to retire at a future date that has a value that changes appreciably over time. At any point in time, the present value of all expected future pension payments can be calculated assuming that the worker retired immediately. Similar calculation can be made assuming retirement at other dates in the future, discounting future income streams to the same point in time. The "option value" of continued work is the difference between the highest present value associated with retirement at any future date and the present value of retiring in the current period. It's advantageous to postpone the retirement as long as the option value is positive. The optimal retirement date occurs at that point where the option value first falls to zero or a negative value.

Stock and Wise used an option value approach to model the retirement decision of 1,500 persons employed by a large, Fortune 500 firm. The key simplifying assumption in the Stock-Wise option value model is that the retirement decision is based on the maximum of the expected present values of future utilities if retirement occurs now versus each of the potential future ages. By contrast, in dynamic model the expected value of the maximum of current versus future options. The expected values of the maximum of a series of random variables will be greater than the maximum of the expected values, so Stock-Wise model can underestimate the value of postponing retirement relative to the dynamic model. Of course which model is more consistent

with retirement behavior of individuals remains a separate question, but Stock-Wise model produced a good overall fit and predicted the retirement behavior of the sample very well.

### 1.3 Determinants of retirement. A review of empirical literature.

Overviewing analysis of retirement in different studies allows to distinguish explanatory factors that have received particular scrutiny in empirical literature. There are health status, pension scheme and social security programs. Of course there are a number of other factors that influence retirement decision, like individual's or job characteristics, local labor market condition etc. In this paragraph we list nearly all of the factors together with the direction and explanation of their influence.

Let's start with the job's characteristics.

*Job characteristics*

As was shown earlier, a net effect of the influence of wage size on retirement decision is ambiguous. Higher current wage produces an income effect, which tends to encourage earlier retirement, and a substitution effect, that makes the leisure costly and discourages early retirement. Thus the influence of wage size on retirement behavior depends on individual's preferences for work/leisure.

That's why there is no unique result in empirical studies. For example, Hurd and Boskin (1981), Quinn (1977) find no effect of the current wage on retirement. However, Burhauser and Quinn (1980) find some deterrent effects of current wage on retirement.

*Education level*

Lazear point out that the shape of age-earnings profile is an important determinant too. Steeper profile is likely to discourage leisure taken early in life and to encourage later retirement than the flat one. Mincer (1974) explains this with differences in education level. He showed that the age-earnings profiles are parallel in logs as education changes. This implies that more educated individuals have steeper age-earnings profile in absolute levels. Steeper profile in its turn reward work in later years relative to work in earlier years.

This evidence was found in the study of Burkhauser (1979). However he did not implicitly incorporate in the analysis individual's education level. In the studies of Alicia H. et al, and A. Kalwij, F. Vermeulen level of individual's education had been taken into account and was associated with the positive influence of the age of retirement.

So, the individual's level of education is an important determinant that affects the retirement behavior through the way of individual's earnings growth during lifetime.

*Nature of job*

Another important factor is a nature of the job on which people find themselves prior o retirement. For example, early research concluded that people in physically demanding jobs retire earlier (Gustman and Steinmeier, 1986)

*Institutional rigidities*

Apart from the size of earnings and their growth throughout the lifetime, there are some workplace rigidities that might force older workers into retirement One of these factors is a mandatory retirement, which used to insure that workers upon reaching the retirement age leave the job. The essence of this practice is explained by Lazear (1979). In the deferred compensation scheme, when workers are unpaid when young and overpaid when old relative to their productivity, mandatory retirement is a only way to ensure that the worker's total compensation doesn't exceed his lifetime value to the firm because it requires that workers leave the job at some (previously agreed on) point.

Also, this can be inflexibilities regarding hours or days of work, job pace and job stress, the need for acquisition of new skills on the job and perhaps, even employer attitudes toward older workers Nevertheless the perceived importance of these factors in retirement behavior, most of them have not been yet incorporated in economic analysis of retirement behavior.

*Marital status and existence of children.*

The individual's family is another important determinant of the retirement decision. Firstly, the income of the spouse affects the wealth level of the household and that's why the demand for leisure of both individuals. Because of the recognition this influence there were some attempts to incorporate this aspect of joint-decision in family context into models of retirement behavior. But due to data limitations empirical studies of such models of joint-decision in the family context don't receive many attention/

Secondly, the value of leisure might depend on the presence of the spouse and that's why widows and married individuals might have different retirement behavior. For example, the married elderly might prefer to retire earlier to spent more time with his/her partner, whereas widows in the age of retirement may prefer to work as long as possible to escape the feeling of loneliness without job and his/her partner. This evidence was found in the study of Alicia H. et al (2003).

Thirdly, individuals with wealthy children may enjoy some transfers in old age and these transfers may affect retirement behavior, for example, due to income effect.

Moreover, individuals with one or more children in elderly age may be involved in grandparents' activities that claim much time and force them to leave a job. It's especially true in Russia, where young parents, in order to continue their career path, prefer to leave their babies

with grandmother /grandfather than hire nurse. And that's why the elderly, especially women may be forced to retire as soon as possible.

In the analysis of A. Kalwij, F. Vermeulen (2005) they found that the presence of many children affects differently the retirement behavior of women and men: it forces to retire women whereas encourage men to work more and postpone their retirement. The explanation for women have been already done before, they are occupied with caregiving activities with their grandchildren. As for men, everything depends on the age of children. The older they are the more they are financially independent and even can help their parents with money in order to give them a rest from work. But the younger they are the more efforts should be done by their parents to help then to enter the university and to study comfortably there without thinking where to get money for studies or for accommodation etc. And this fact requires the continuation of work and that's why men have to postpone their retirement. Herewith the bigger the number of children in the family is the bigger the probability that there are some of them that are financially dependent exists.

Altogether, it makes evident that the marital status, child presence and their number influence the retirement decision of the elderly.

*Health status*

Many studies apart from focusing on financial determinants of retirement have also examined individual's characteristics and more particular, the influence of health on retirement (Boskin and Hurd (1981), Gustman and Steinmeier (1986) etc.). Most of these studies found that the poor health encouraged early retirement (Rust, 1989)

As argued by R. Lumsdaine health has 2 central effects – on the budget constraint and on preferences. Focusing firstly on the budget constraint, most would acknowledge the detrimental effect of poor health on employee compensation profile. Ill employees are less productive in the short run, suffer more absenteeism in the medium run and be less likely to invest in longterm skills in the long run. That's why poor health of older workers in comparison with the health status of young employees reduces older workers employability and detracts from their compensation offers. In response to this lower payment, older workers might be likely to leave their jobs, reduce hours and eventually retire.

To the negative effect of illness on wages must be added the possibility that poor health can alter the value of peoples' time or change one's time horizon if the person has mortal disease. For example, ill person needing to devote several hours per day to heath treatments would simply have fewer hours per day in which to work.

Also poor health can influence retirement by changing people perception of the utility of work versus leisure. This can happen because the worker's job becomes more stressful or it might occur if the ill person values home time more when feeling unwell.

So there are a number of ways in which health conditions can affect the retirement behavior and including health measures in the analysis of retirement is important thing to do. But measuring the individual's health status appropriately is difficult task for researchers. There have been developed a variety of health measures, including self-evaluation of health status, reported weeks of illness and mortality experience. But there may be problems with some of them that should be taken into account while choosing the proxy for health evaluation in empirical analysis.

Individual self-evaluation of health status reported in the period of the retirement behavior has been often criticized because individuals may be claiming poor health after they retire in order to justify reduced labor force participation (Bazzoli, 1985). Early retirees reported being in worse health than more objective measures would suggest. More than that, studies that have used this self-assessment of health have often found that health is more influential than financial consideration in explaining retirement – the fact that was argued in a later research.

Attempts to fix this problem by using survey information related to health that don't involve self-assessments are also not free from drawbacks. As pointed out by Bazzoli, such health measures as total hours of illness in a given year, are more objective in nature, but the relationship between such indicator and the presence of limiting health condition is not clear. Many illnesses are temporary and don't have long-term impact on health status and don't influence the person's ability to work near the retirement age.

Another approach elaborated by Burkhauser and Quinn (1981) consists in using self-assessment of health status prior to retirement. Thus, this measure is unaffected by ex-post rationalizations of retirement and thus don't produce bias in estimations.

*Pension payments*

A number of studies examine the effect of pension payments on retirement behavior. Boskin and Hurd (1978) found that the higher the size of eligible pension at the time of retirement, the more likely the individual retires. But this finding has been completed in later research because the institutional organization of pension provision have been changed in time in order to address the ageing population process and allowed to see others aspects in the retirement behavior in response on different impetus in pension provision. For example, Gustman et al (1994) received evidence that workers with generous pensions retire somewhat earlier than those with smaller pension. These differences are statistically significant but small. At the same time, employees

received more money to delay retirement tend to do so. Here too, the estimates are statistically significant but small.

However these estimations might be overstated, to the extent that firms design their pension plans to attract workers with tastes for retirement. Thus an early retirement benefit program might appear to be correlated with a high fraction of early retirees, but the correlation might not be a proof of causation. Therefore the researchers have turned to examine worker responses to unanticipated early retirement windows arguing that this type of data better represents worker response to exogeneously changing pension opportunities.

*Demand side in retirement models*

Most studies of retirement behavior have concentrated on the supply side of the market, leaving the demand for older workers neglected, as pointed out by Straka (1992). Older workers often complain that suitable opportunities are limited. Many older workers would prefer to continue working part-time for their employer rather than retire completely, but few employers appear to offer this option. Continued employment for the older worker usually entails a change in employer and may be in character of work. The constraints that govern the individual choices should be taken into account while studying the retirement behavior.

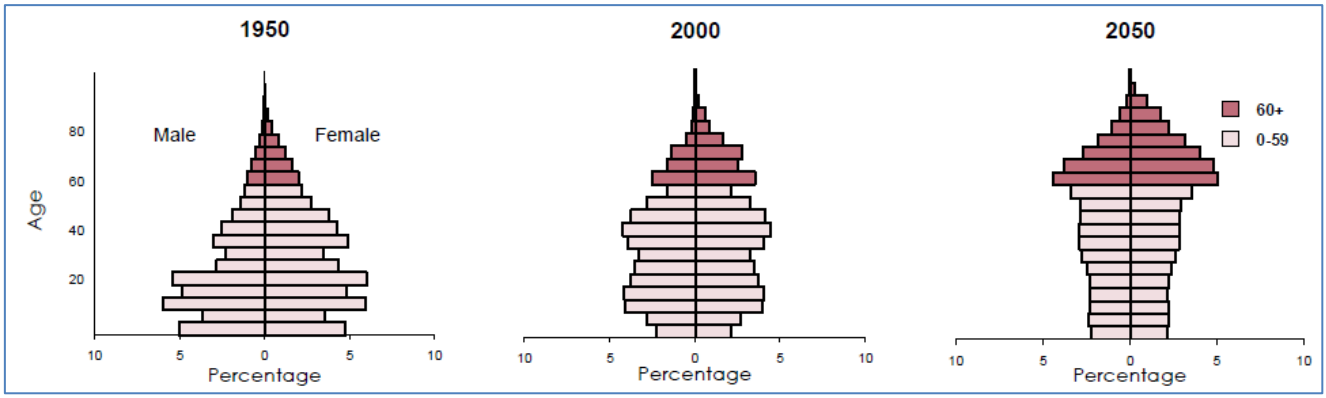
# Chapter 2. Case of the Russian Federation

## 2.1 Population ageing in the Russian Federation

Global tendency of population ageing is also typical for the Russian Federation. In the 21st century older Russians are expected to make up a larger share of the Russian population, live longer and spend more years in retirement than previous generations. However, process of population ageing in Russia is characterized by more severe character (see Figure 8). It occurs faster due to small value of fertility rates that are below the replacement rate (fertility rate was 1,54 in 2009[1]).

Figure 8

Population pyramids

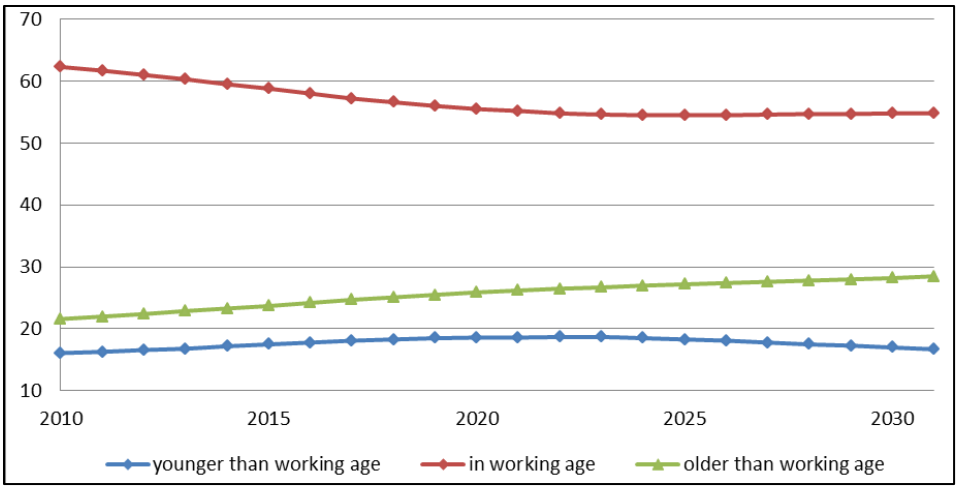



Source. UN, 2001

The share of Russian population aged 65 and older constituted 6,2% in 1950, increased to 14% in 2000 and is projected to continue to grow till 22,3% in 2030 and 27,8% in 2050 (UN, 2009). The same prospects are indicated by Russian experts (see Table 4).

Table 4

Total population by major age groups




[1] Federal State statistic service: http://www.gks.ru/bgd/regl/b10_44/IssWWW.exe/Stg/d01/02-11.htm

Source: Federal State statistics office

Given that in Russian pension system there are some pension priveleges for retirement before legally settled age, as well as social pension provision for disabled young population, the dependancy of the pensioners on working age population is even bigger and has already achieved 562 pensioners to 1000 employees in 2008 (Maleva, Sinyavskaya, 2011).

At the same time, there are some privileges for pension contributions payment, for example, for small entreprises that use reduced form of taxation, for entrepreneurs. We should also mention the existence of shadow economy. Estimations of the size of shadow economy in 162 countries shows that in Russia it is bigger than in comparable countries and constitues a chare of 41% of GDP. In Brazil it's 37, in Turkey – 29, in India – 21, in Republic of South Africa – 25%. These tendencies indicates that actual dependent ratio is even more bigger because reduced form of taxation and, moreover, the employment in shadow economy reduces further the total amount of contributions to pension system.

All these factors together threaten the financial stability and solvency of the Russia's pension system. It means that keeping replacement rate of pensions at the current level will be impossible without significant change in the structure of pension provision.

### 2.2. The Russia's pension system.

Basic principles of current Russian pension system were established in 2002. It based on mandatory retirement insurance, where employers who carry out activities on territory of the Russian federation should make compulsory retirement contributions for every employee they have. The sum of all contributions is a basis for pension provision for current and future pensioners due to composite structure of pension contributions (see table 5).

Table 5

The social contribution rate

| | The Pension Fund of the Russian Federation | | Compulsory Medical Insurance Fund | Social Insurance Fund |
|---|---|---|---|---|
| | Insured component | Funded component | | |
| For those born in 1967 and later | 16 | 6 | 5,1 | 2,9 |
| For those born in 1966 and earlier | 22 | 0 | 5,1 | 2,9 |
| For those born in 1967 and later[2] | 10 | - | 0 | 0 |
| For those born in 1966 and earlier[2] | 10 | - | 0 | 0 |

Source: official site of Pension Fund of the Russian Federation.

Insured component of social contributions is counted on special notion account and constitutes a basis for payment of insured part of individual's pension in future. Every year they are indexed according to the average wage growth and Pension Fund of the Russian Federation (PFRF) revenue per pensioner growth, but not higher than the PRRF revenue per person increase. Actually this money goes to pay pensions for current pensioners.

Funded component of social contributions is obligatory for working people born in 1967 and later and voluntary for others. More particularly, workers born in 1966 and earlier can participate in the State pension co-funding programme and determine the size of voluntary contributions. These contributions are included into special part of person's notional account and operated by Management Company chosen by individual. Person has a choice between:

- State management company – Vneshekonombank. This company invest funded parts of social contributions only into state bonds, that are less risky and less profitable
- Private management company, chosen by the bidding. These companies have bigger list of assets to which pension contributions can be invested.

This is a mechanism of labor pension provision, the most common type of pension in Russia. According to the federal law "Labor pensions in the Russian Federation", normal

[2] This value of social contribution rate applies when marginal revenue exceeds the value of 512 000 rub (in 2012).

pension age for the labor pension is 60 years for men and 55 years for women and they must have at least 5 years of pension insurance coverage.

Nonetheless, apart from different types of labor pension (disability labor pension, survivor labor pension etc.) there are other types of pensions (social pension, old age pension). That's why all Russian citizens are totally covered by pension payments. Due to number of state, social types of pension, a number of pensioners exceed the number of individuals in pension age. In the beginning of 2010 there was 30,7 mln individuals (21,6% of total population) aged above working age and 39,1 mln pensioners (27,5% of total population). That's why average age of becoming pensioner is lower than officially determined age of retirement. According to estimations from Russian Longitudinal Monitory Survey, it is equal to 51,2 for men and 52,3 for women.

Generally the Russia's pension system implies a high level of population coverage with pension insurance. But there are a lot of different characteristics of assessment of pension system quality. One of those characteristics is a comparison of pension size with minimum subsistence line which allows to estimate an adequacy in providing sufficient level of income.

In Russia even before 2002 poverty level among pensioners was lower than among whole population. However, in 2002 Russian Government decided to bring pension size to minimum subsistence line for pensioners and was quite successful in achieving it since that time (see Table 6).

Table 6

Key characteristics of pension system

| | 2000 | 2002 | 2003 | 2004 | 2005[3] | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| Average pension size to minimum subsistence level | 76,4 | 100 | 102 | 106,3 | 97,8 | 99,8 | 101,6 | 115,2 | 126,6 | 165,4 |
| Average pension size to average size of wage | 31,2 | 31,6 | 29,8 | 28,4 | 27,6 | 25,6 | 22,9 | 24,3 | 27,9 | 35,7 |

Source: Russian Federation Federal State statistic service

Another approach to this assessment is a replacement rate comparison. According to International Labor Organization (ILO), the target level of pension size is set at 40% of lost earnings. This measure is relevant for a pensioner with 30-year work experience and average wage size. But its current applicability is limited by the fact that it was approved in 1952 in essentially different socio-economic situation, with minimal female labor force participation, when 40% replacement rate was regarded as sufficient for a pensioner with the wife who is also in retirement age. We can complement ILO recommendation with the analysis of current

[3] The composition of consumer basket for pensioner was enlarged

international practice (see Table 7). In general, it gives us an evidence of significant variation of replacement rate in different countries, even in developed countries – OECD members.

Table 7

Replacement rates in different countries

| **Country** | **Replacement rate** | **Country** | **Replacement rate** |
|---|---|---|---|
| Australia | 47.4/44.7[4] | Japan | 34.0 |
| Austria | 67.9 | Netherlands | 87.0 |
| Belgium | 38.2 | Mexico | 37.3/35.3[5] |
| Canada | 42.0 | Norway | 48.3 |
| Czech Republic | 47.5 | Spain | 73.4 |
| Denmark | 80.4 | Sweden | 64.3 |
| France | 44.4 | Switzerland | 49.6/49.0[5] |
| Germany | 39.3 | Turkey | 68,4 |
| Greece | 81.8 | United Kingdom | 30.3 |
| Iceland | 100.4 | United States | 37.5 |
| Italy | 64.7 | ***OECD34*** | ***55.3/53.8***[5] |

Source: Pensions at a Glance, 2011, p. 141

According to the Russian Federal State statistic service, replacement rate achieved 35,7% for the first time in 2010 (see Table 6). It was a result of costly pension reform aiming at the pension size increase. But this achievement is still far away from OECD figures.

Affordability of Russian pension system, measured by it burden to the federal budget and taxpayers who make pension contributions, also leaves much to be desired. In average OECD countries spent 2-2,5% of GDP for pension provision (additional to pension contributions), which ensures 21-22% of all pension payments (see Table 8).

Table 8

Pension system "burden" to the federal budget

| Country | Budget Financing of pensions | | Country | Budget Financing of pensions | |
|---|---|---|---|---|---|
| Developed countries | Budget expenditures (% GDP) | Budget expenditures (% GDP) | Developing countries | Budget expenditures (% GDP) | Budget expenditures (% GDP) |
| Austria | 3,8 | 30 | Bulgaria | 3,3 | 39 |
| France | 0,4 | 3 | Czech republic | 0 | 0 |
| Germany | 3,3 | 31 | Hungary | 2,2 | 21 |
| Greece | 3,2 | 27 | Poland | 4,7 | 41 |
| Italy | 3,6 | 26 | Romania | 0 | 0 |
| Portugal | 1,5 | 13 | Slovakia | 2,2 | 32 |
| Spain | 0 | 0 | *Average in developed countries* | *2,4* | *20,5* |

[4] For men and women respectively

| | | | | | |
|---|---|---|---|---|---|
| Sweden | 3,2 | 34 | *Average in developing countries* | *2,1* | *22,1* |

Source: Gurvich, p. 16

According to the estimation of Economic Expert Group, Russia's government transfer from federal budget to pension payments rose by 3,2% of GDP, from 1,5% in 2007 to 5,2% in 2010 (see Table 9). Generally, this is a result of costly pension reform 2010 aiming at the increase of pension size and replacement ratio.

Table 9

Pension system "burden" to the federal budget in Russia

| | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| Transfer from federal budget | 1,5 | 2 | 3,3 | 5,2 |
| Share in public pension provision | 24 | 28 | 45 | 60 |

Source: Gurvich, p.8

By comparison these figures with figures from Table 8, it's evident that both the federal budget transfer and the share of the government financing in pension provision are higher in Russia than across OECD countries.

At the same time Russian contribution rate is bigger than average in OECD countries (see Table 10). Only pension systems of Spain, Italy, Hungary, Chile and Czech Republic involve bigger contributions.

Table 10

Pension contribution rate (per cent of gross earnings)

| Country | Employee 2009 | Employer 2009 | Total |
|---|---|---|---|
| Australia | Private pensions contributions only | | |
| Austria | 10.3 | 12.6 | 22.8 |
| Belgium | 7.5 | 8.9 | 16.4 |
| Canada | 5.0 | 5.0 | 9.9 |
| Czech Republic | 6.5 | 21.5 | 28.0 |
| Chile | 28.8 | 1.0 | 29.8 |
| Denmark | Private pensions contributions only | | |
| France | 6.8 | 9.9 | 16.7 |
| Germany | 10.0 | 10.0 | 20.0 |
| Greece | 6.7 | 13.3 | 20.0 |
| Iceland | No separate pension contribution | | |
| Italy | 9.2 | 23.8 | 32.7 |
| Japan | 7.7 | 7.7 | 15.4 |
| Netherlands | 17.9 | 0.0 | 17.9 |
| Mexico | Private pension contributions only | | |
| Norway | Private pension contributions only | | |
| Spain | 4.7 | 23.6 | 28.3 |

| | | | |
|---|---|---|---|
| Sweden | 7.0 | 11.9 | 18.9 |
| Switzerland | 4.9 | 4.9 | 9.8 |
| United Kingdom | No separate pension contribution | | |
| United States | 6.2 | 6.2 | 12.4 |
| ***OECD34*** | ***8.4*** | ***11.2*** | ***19.6*** |
| ***Russian Federation*** | ***0.0*** | ***26.0 (22 from 2012*** | ***26.0 (22 from 2012*** |

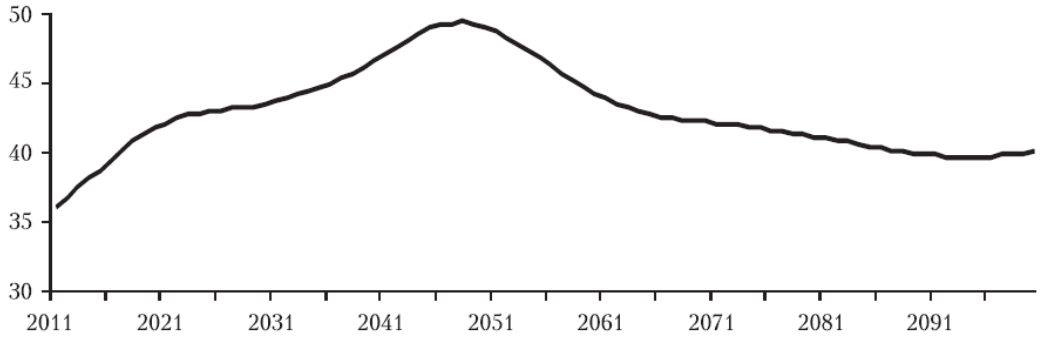
Source: Pensions at a Glance, 2011, p. 153

To sum up, Russian pension system, implying bigger part of federal budget financing (as a share of GDP) and higher rate of pension contributions, afford lower replacement rate than in OECD countries. This state of things clearly indicates pension system inefficiency.

More than that, long-term sustainability of Russian pension system is further jeopardized by the process of ageing of the population (see Table 4). Taking into account politic influence of the pensioners, the fact that they constitutes 37% of electorate and this share will expand further in the future (see Figure 9) and their high activity during elections, recognition of a drop in the value of replacement rate (consequence of population ageing for PAYG-systems) would be hardly possible and, on the contrary, they will at least, argue for stable value of replacement rate.

Figure 9

Pensioners' share in electorate




Source: Gurvich, Kudrin, p. 19

According to Gurvich's estimations (Gurvich, 2010), to preserve constant value of replacement rate and prevent it from gradual reduction, it will be necessary to add 1 percent point of GDP to federal budget transfer every 5 years during 2010-2050 or to increase annually the rate of pension contributions by 1 p.p. Near the same increase (9,4 p.p. of GDP) in federal budget transfer during 40 forthcoming years is predicted by Standard & Poor's agency for Russia.

Clearly, increase in financing of pension system either by enlargement in federal budget transfer or by rise in the rate of pension contributions is unacceptable for economy. In short-run these methods will create such problems as reduction in competitiveness of economy due to unproductive use of resources and labor supply distortion. In long run this method leads to

economic crisis. Dealing with problem of population ageing via the rise in the pension contributions rate means that the value of rate will attain 70% in 2050! The second possibility, rise in budget share of pension financing, implies an increase in share of GDP devoted to pension provision by 9 percent point in 40 years. It seems also impossible from economic point of view because it can be done only by tax increase or reduction of other budget expenditures. But even now we are spending bigger part of budget resources and have bigger rates of pension contributions but aren't capable to achieve the level of replacement rate of developed countries.

The only way to deal with the problem of population ageing and threat of financial sustainability of Russian pension system is increase in retirement age. For example, according to Gurvich's estimations, an increase in the retirement age from values determined by law to 62,5 for both men and women will allow to increase a number of employees by 9,9% and decrease the number of pensioners by 35,9% and obtain the replacement rate that is higher by 171%. Furthermore, the Russian Federation has now one of the lowest ages of retirement (55 for women and 60 for men) which was established in 1932 in USSR as an achievement of socialism and has not been revised since then (see Table 11).

Table 11

Retirement age in different countries

| Country | Retirement age for | | Life expectancy at retirement age | |
|---|---|---|---|---|
| | men | women | men | women |
| Australia | 65 (67 in 2050) | 62 (67 in 2050) | 18.6 (19.7) | 24.3 (23.3) |
| Austria | 65 | 60 (65 in 2050) | 17.5 (21.1) | 25.1 (24.5) |
| Canada | 65 | 65 | 18.3 (21.4) | 21.4 (24.8) |
| Czech Republic | 61 (65 in 2050) | 58.7(65 in 2050) | 17 (18.1) | 23.8 (22.5) |
| Denmark | 65 (67 in 2050) | 65 (67 in 2050) | 16.4 (17.2) | 19.8 (21) |
| France | 60.5 (61 in 2050) | 60.5(61 in 2050) | 21.7 (24.8) | 26.5 (29.5) |
| Germany | 65 | 65 | 17 (20.3) | 20.7 (24.4) |
| Greece | 57 (60 in 2050) | 57 (60 in 2050) | 24 (24.1) | 27.1 (28.3) |
| Italy | 59 (65 in 2050) | 59 (65 in 2050) | 22.8 (20.9) | 27.4 (25.5) |
| Japan | 64 (65 in 2050) | 62 (65 in 2050) | 19.8 (21.6) | 26.7 (27.7) |
| Mexico | 65 | 65 | 17.2 (18.9) | 19.4 (21.9) |
| Netherlands | 65 | 65 | 17.3 (20.6) | 20.4 (23.5) |
| Norway | 67 | 67 | 15.7 (18.9) | 18.9 (22.5) |
| Portugal | 65 | 65 | 16.3 (19.2) | 20.2 (23.6) |
| Spain | 65 | 65 | 17.9 (21.4) | 21.8 (25.1) |
| Sweden | 65 | 65 | 17.9 (21.1) | 21.1 (24.2) |
| Switzerland | 65 | 63 (64 in 2050) | 18.9 (22.4) | 24.1 (26.6) |
| Turkey | 44.9(62.3 in 2050) | 41(60.8 in 2050) | 31.1 (22.5) | 36.9 (23.2) |
| United Kingdom | 65 (68 in 2050) | 60 (68 in 2050) | 16.9 (16.9) | 24.5 (21.9) |
| United States | 66 (67 in 2050) | 66 (67 in 2050) | 16.8 (17.7) | 19.3 (21.9) |
| *Average in OECD countries* | *62.9 (64.6 in 2050)* | *61.8(64.4 in2050)* | *18.5 (20.3)* | *23.3 (24.6)* |

| | | | | |
|---|---|---|---|---|
| *Russia* | *60* | *55* | *14,6*[5] | *24,2*[6] |

Source: Pension at a Glance, 2011

Moreover, if assume that employment starts at 20 years and continues till the retirement age, than in OECD countries it is equal to 179% of the duration of retirement for women and 231% for men. For Russian women it equals 143% and it is one of the lowest figures across the world. Only Greece has lower value, but we know how it affected their budget system and the government debt. In order to achieve the average value of OECD countries the retirement age for women should be settled at 59 years. Russian men are characterized by opposite situation; index is equal 272% for them. This value is quite high; however, some other countries (Germany, the UK, USA, and Poland) have the same values (see Table 11).

[5] Accroding to Expert Economic Group estimations in 2009

### 2.3 Evidence of retirement behavior in the Russian Federation

Apart from evident necessity to increase the retirement age (substantial rise in old-dependency ratio, which is deteriorated by the existence of the number of privileges for earlier retirement that magnify the dependency of pensioners on working population) there is an evidence that it is reasonable to do. The scope of pensioners' employment is quite high in Russia, especially in first years after retirement. During the first years after achievement of legal retirement age, near 50% of women and 37% of men continue to work (see Table 12).

Table 12

The share of pensioners who continues to work in dependence of sex and age

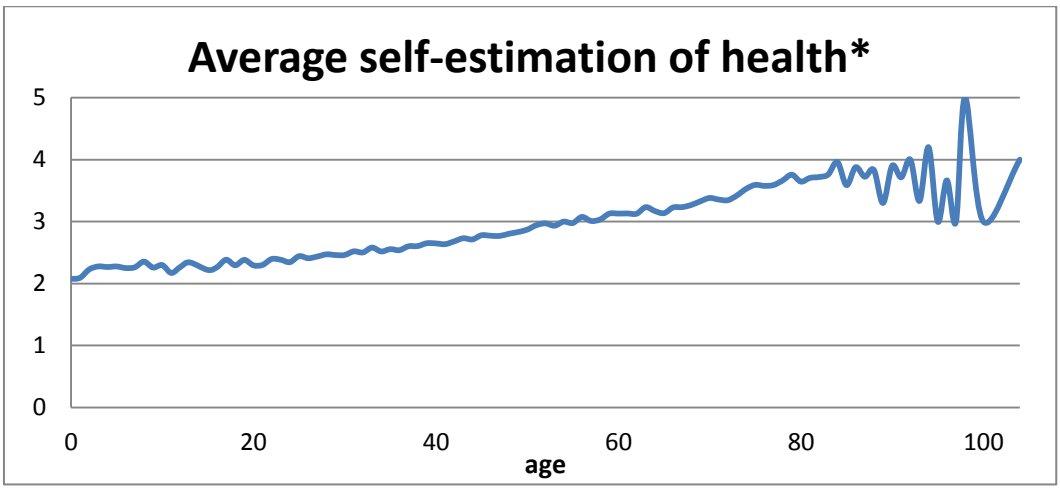
| Age (years) | Share of men that have job | Share of women that have a job | Average share of total population |
|---|---|---|---|
| Less than 55 | 48,4% | 53,1% | 50,9% |
| 55-60 | 45,2% | 47,7% | 47,1% |
| 60-65 | 36,8% | 29,4% | 32,2% |
| 65-70 | 21,8% | 15,5% | 17,8% |
| 70-75 | 11,4% | 7,5% | 8,6% |
| 75-80 | 4,3% | 2,8% | 3,2% |
| More than 80 | 1,6% | 0% | 0,4% |

Source: estimations on the basis of RLMS

Primarily, this is a result of absence of any specific pension provision conditions, which restricted individuals from continuation of work and receiving the pension at the same time. But by allowing this practice, pension loose its main role – a mean of consumption smoothing during individual's lifetime. In Russia pension plays more likely a role of additional revenue after achieving legal retirement age than a role of wage replacement.

Meanwhile, there are a number of opponents to pension age increase that raise some objections. One of the most evident factors that can prevent the longer employment duration is a health status. Of course, health conditions are deteriorating with age but there is no significant change at the achievement of retirement age (see Figure 10). It worsens from age to age. Econometric analysis did not also find any confirmation of threshold age which achievement significantly changes individual's health conditions.

Figure 10




*- 1 – very good, 2 – good, 3 –average, 4 – poor, 5 – very bad

Source: estimations on the basis of RLMS

Pension systems in many countries provide an incentive for the elderly to postpone their retirement and continue to work till older than retirement age. This incentive is expressed either in a reduction of the pension size when person retire earlier (Austria, Canada, Czech Republic, Germany etc.), either in a premium to pension size (Austria, Canada, Czech Republic, Denmark, France, Germany and so on) or simply once-only tax-free lump sum pension bonus scheme (Australia) when person retires later than standard pension age, or in both these kinds of incentives.

In the Russian Federation it's not possible to claim the pension before the normal eligibility. However there are a big number of privileges that allows to claim the labor pension or state pension earlier. For example, military, civil servants, teachers, citizens and workers from far north regions start to receive pension earlier that legal retirement age.

As for later retirement, it can be deferred but no more than for 5 years. Every year of retirement deferral decreases the expected period of pension payment. Since funded and non-fixed part of insured component of pension is a distribution of the accumulated capital over expected payment period, the deferral results in the increase of the size of these parts of pension. (in Russia pensions consist of insured and funded components. The insured part is formed at the expense of contributions, paid to the person's individual pension account after 1st January 2002, and by transformation of the person's pension rights acquired before 2002 into settlement pension capital. At the same time the insured part includes basic fixed labor pension, which was equal to 2 963 rubles in 1st February 2011. Funded component is a benefit based on the value of person's savings and interest for them).

However, such scheme doesn't provide good incentive to retire later because there is no difference between these variants as long as we situated during expected payment period. The

amount of accumulated capital is the same, the period of it distribution becomes smaller and it's it that forces to change the pension size. But if we take into account the cost of time (tomorrow's money doesn't equal to today's money) someone would prefer to have smaller amount of money but today especially in a country where inflation is high. And Russia is an example of such country. The deferral can be beneficial when person believe that he would live longer than the expected payment period because he will receive the bigger amount of pension till his death even if the expected payment period ends. But it's unlikely that somebody knows his future. To hope on this opportunity is irrational, because you can die till the next year, the date of start of pension payments, without receiving any money. The possibility of pension capital accrual because of deferral had been only discussed in the Russian government and will start to function in several years.

Further, the minimum expected period of pension payment was 192 month (16 years) in 2010. But cause of the pension reform 2002, this expected period has been changing since January 2002. It increased by 6 months from 144 (12 years) till 192 months (16 years) and increases by 12 month till it achieves 19 years (see Table 13). After that it will be determine by federal law on the basis of statistical data about lifetime of pension receivers.

Table 13

Expected period of pension payments

| | |
|---|---|
| 01.2002 | 144 months (12 years) |
| 01.2003 | 150 months |
| 01.2004 | 156 months (13 years) |
| 01.2005 | 162 months |
| 01.2006 | 168 months (14 years) |
| 01.2007 | 174 months |
| 01.2008 | 180 months (15 years) |
| 01.2009 | 186 months |
| 01.2010 | 192 months (16 years) |
| 01.2011 | 204 months (17 years) |
| 01.2012 | 216 months (18 years) |
| 01.2013 | 228 months (19 years) |

Source: Federal law "About labor pension in the Russian Federation", paragraph 32

So the deferral during this period lost practically all his small benefit and that's why for Russian pensioners there is no real option to retire now or to postpone the retirement by one year, it's always better to retire as soon as possible and to combine work with the pension

payments as there is no any income test for pensioners. That's why we can't apply the option-value model of Stock and Wise (1990) in analyzing the retirement behavior of pensioners. But still, some individuals prefer to give up a job as soon as they start to receive pension payments and the possible influence of retirement age increase can't significantly affect their life. Thus it is worthwhile to analyze the retirement behavior of individuals and to find out which factors are related to retirement decision and how they are related.

# Chapter 3. Empirical analysis

## 3.1 Data, methodology and hypothesis.

The objective of this study is analysis of retirement behavior in Russia. There are a number of ways to define retirement and appropriateness of the definition depends in large part on its aim. Lazear (1985) distinguished 5 possible objective definitions of retirement:

1) The individual is out of the labor force with the intention of remaining out permanently
2) The individual has reduced his hours substantially from some lifetime average and intends to maintain hours at or below the current level
3) The individual receives some of his income as pension benefits
4) The individual appears on some company's retirement roll
5) The individual receives primary social security payments

Lazear considers that the first definition is most appropriate if one is interested in discussing patterns of labor force participation by age, over time or cross-sectionally. The second one is useful for the analyses that focus heavily on hours in the labor force. The third is applicable when studying the well-being of various groups in the population or when trying to estimate pension costs over time or by region. The forth is of interest when the study relates to turnover or duration of employment in general. The fifth may be the definition of choice for studies having to do with social security, its costs, benefits and cross-subsidies effects.

The fifth definition is irrelevant for Russia as it doesn't have social security program that would be a separate part of pension payments. Analysis of the retirement behavior in Russia is necessary for understanding the factors of retirement and that's why is relevant for pension system financing and pension reform concerning the retirement age increase. That's why for the purpose of this study it would be better to determine the retirement as a process when the individual receives pension benefits. Thus, retirement behavior is individual's behavior is a choice between two alternatives: to continue to work further or to leave the job.

*Data*

Data for this analysis are drawn from the Russian longitudinal monitoring survey (RLMS), a series of nationally representative surveys of individuals and households in the Russian Federation. It has been run jointly by National Research University – Higher School of Economics and the Demoscope team with a participation of the Carolina Population Center at the University of North Carolina at Chapel Hill. RLMS had been conducted 19 times since 1992 and is still only source of information about socio-economic position and health conditions of Russian population.

In the study we used data for 6 subsequent years from 2005 to 2010, data from $15^{th}$ to $19^{th}$ waves of the surveys. To analyze the determinants of retirement decision, individuals who worked in 2005-2009 years and started to receive pension benefits in 2006-2010 years were selected from the whole base of observations. Moreover, the sample was restricted to individuals who are beneficiaries of different types of labor pension apart from beneficiaries of "loss of breadwinner" type of labor pension. In order to concentrate on the actual retirement behavior we focused only on those individuals who take these retirement decision voluntarily and left apart all individuals who have been fired or forced to leave the job because of the tense relations with front office or job cut. Thus we know that the observed behavior is a real choice of individuals that is not a case for those who can't continue to work because of different reasons even if they want.

Altogether, these actions resulted in the sample of 558 individuals. The most important criterion is the person's participation in $19^{th}$ wave of survey. The data from this wave serves as a source of information about the beginning date of pension payments and the behavior of a particular pensioner after the achievement of retirement age.

The dependent variable is a decision of the pensioner who just started to receive pension benefits. He has 2 options:

- to continue to work further and thus receive pension payments and wage simultaneously
- to leave his/her job and to remains out of labor force.

Thus, it is binominal variable which takes a value of 1 if pensioner continues to work while starting to receive pension benefits and takes a value of 0 if the person give up a job. Variable that allows to indicate the retirement decision of particular pensioner is a period of time that the person worked after starting to receive pensions. Null duration we interpret as a decision to leave the job and that's why Y takes the value of 0. And if in a survey a person reported some duration of employment after retirement date it was treated as his/her decision to continue to work further, thus Y takes a value of 1. However, in some cases, when the duration of work period after retirement date don't exceed several months (from 1 to 3 months) and more than this pensioner reported that he/she has not more job on the date of survey we regarded it also as a decision to remain out of labor force. We made such decision because, first of all, there a few persons like this. They are significantly different from other respondents and between duration of 1 to 3 months there is some gap to those who decided to work further after retirement. Secondly, only some small things don't allow to a person to leave a job right on the time of retirement. Among them we can list that the employer needs some time to find a new employee and can ask the retiree to transfer his experience and to teach a new employee. Also, the retiree can

technically overstay because of sick leave or a vacation. Thirdly, he/she can delay the application for pension and because of the pension assignment takes some time it can also resulted in some work after retirement day.

Thus, logit/probit analysis is used to estimate the probability of work continuation after the achievement of retirement date and to find out the determinants of such decision. Because of the differences in legally set retirement age of women and men and also due to potential differences in the reasoning of retirement decision the logit/probit analysis is carried out separately for sub-sample of men and women.

*Independent variables.*

The choice of independent variables is related to the review of empirical literature and is restricted by information that contains in questionnaires of RLMS. Thus, we dispose with such independent variables as:

- wage size.

The values of this wage size were taken in a year prior to retirement date. If a person reported that he started to receive pension benefits in 2008, than we were looking for the values of wage size in 2007, if there is no data in 2007, we checked the data from 2006 and if not – from 2005. In order to assure the comparability of wage size in different years, we take the relative value of a person's wage to the average wage in the sample of that year. Thus for each individual we have a percentage ratio of his/her wage.

As was discussed above, there is no definite prediction about the wage influence on the person's labor supply. It creates simultaneously substitute effect that makes leisure more expensive and encourage to work, while income effect incites to work less. Thus, the wage effect on the retirement decision is ambiguous.

- pension size

The values of pension size were taken in a year when the person retires with a hypothesis that exactly this value (obtained in a year of retirement) is the most influential in the person's decision to continue to work further/to retire. If the data were not available in this year we take values from subsequent years. The same principal for data comparability underlies this variable. We use a percentage ratio of person's pension size to the average one as a regressor in an econometric analysis.

Here, the direction of impact on the retirement decision is more evident. Pension is another source of income and therefore creates only income effect. So, the higher pension size is, the more likely the person gives up a job.

- Self-estimation of health status.

This variable reflects individual's assessment of his/her status. It's assumed that the more positive health estimation individual has the more likely he will work further, because it's self-sentiment that really matters. This variable takes a value of 1 if individual feels himself/herself very good, 2 –good, 3 – when individual feels himself/herself so-so, he/she can't say if his/her health is rather good or rather bad, 4 – when he/she feels bad, 5 – very bad. In order to escape problems with endogeneity described by Bazolli, the data were taken from the waves of survey prior to retirement. However, some objective measures of health were used too with supposition that the worse health condition individual has the more likely his/her decision to give up a job. The objective measures used in this study include:

- The existence of health problems. It reflects the existence of any kind of health problems within 30 days prior to survey. It takes value of 1 if person has them and 0 otherwise. The data were taken from the waves of survey prior to retirement or in case of data absence for these years in a year of retirement.
- Disability. This variable reflects the fact if person is disabled (then the variable takes a value of 1) of not (variable takes a value of 0). Disability significantly limits the ability to work and thus it's assumed that disabled persons gave up their work and retire more often. The data for this variable were taken from waves of survey prior to retirement and in case of the data absence in those years in a year of retirement.
- Hospital. This variable is an answer to the question if during three last months person has spent some of these days in hospital. If the answer is positive than the variable takes a value of 1, if the answer is negative – the value of 0. The fact that person has spent some days in hospital gives an evidence that he/she has some problems with health and that's why less likely to continue to work further. The data for this variable were taken from waves of survey prior to retirement and in case of the data absence in those years in a year of retirement.
- Heart disease. This is dummy variable of existence of heart disease that takes a value of 1 if person has it and a value of 0 otherwise. Heart diseases are main reason of mortality in Russia therefore they can be fair and objective indicator of person's health status. The data for this variable were taken from waves of survey prior to retirement and in case of the data absence in those years in a year of retirement.
- Heart attack (infarct). As heart disease presence can be not evident for individual it cannot affect his/her retirement decision, while its development can't remain unnoticed for him/her and that's why it takes a participation in

his/her retirement decision. This variable takes a value of 1 if person experienced heart attack and a value of 0 otherwise. The data for this variable were taken from waves of survey prior to retirement and in case of the data absence in those years in a year of retirement.

- Child existence

This variable reflects whether a particular person has children. Its values were taken from the answer to corresponding question of survey prior to the retirement date. If such data were not available, we seek for them in a year of retirement or in any of subsequent years with an assumption that this type of variables can varies only slightly in time. Thus it takes a value of 1 if the person has at least one child and the value of 0 if the person has no children at all.

It's supposed that if a person has children, he/she has can count on some financing support from them and that's why give up job earlier. Also a possibility of grandchildren existence (that can't be traced in RLMS questionnaires) can also distract the elderly from labor participation in order to care about them. But it's truer for women.

- Child number

This variable of the same character as a previous one but allows to check some hypothesis about the choice of retirement because of necessity of caregiving activities to grandchildren in detail because the bigger number of children person has the bigger number of grandchildren is. Its values were taken with the same idea and the same order as the values of previous variables. However, this variable has a value from 0 to 7.

- Youth existence

This variable has also the same character as a previous one but allows to concentrate on a hypothesis of deferral of the retirement because of necessity to help children that are still financially dependent. If the pensioner has minors it can induce him/her to work further in order to help their education and formation. However, the idea and the order of receiving the data is the same as for the previous two variables. The variable takes a value from 0 to 3.

- Marital status

This variable is a marital status of individual that takes a value of 0 if a person is a widower or have not been married at all and a value of 1 if a person is married or is situated in civil marriage. The data are taken from the survey of the year of retirement or if such data were not available from previous or subsequent years. There is no accurate hypothesis concerning the behavior of married pensioners. A lot depends on happiness of marriage.

- Education level

This variable reflects the highest obtained level of person's education. It takes a value of 1 if a person has accomplished only several years of primary schools, a value of 2 in a case of

unfinished secondary education, a value of 3 when he/she has some additional education to his/her unfinished secondary education, a value of 4 – in a case of completed secondary education, a value of 5 – in a case of specialized secondary education, a value of 6 – in a case of higher education and academic degree. The values of variable were taken from the survey of the year prior to the retirement date or of any subsequent or previous years. This variable doesn't vary in a time when individual is about his retirement date.

- Harmful conditions of the job

This variable describes the health hazard of individual's job. Some professions imply harmful conditions for the individual's health because of their nature (for example, iron works, miner labor) and that's why can limit the ability of a person to work and induce hin/her to retire earlier. This variable takes value of 0 if a person's job is not harmful for his/her health and a value of 1 if it has health hazard. The data about the character of individual's job were taken from the survey's information prior to the retirement year.

- State-owned company

This variable is another characteristic of person's job. It's assumed that a pensioner have more chances to work longer in a state-owned company that in private one. It can be related with a number of reasons. Firstly, the employment in public sector is not so prestige in Russia, that's why there is always a shortage in young specialists who wants to work there and so, more possibilities for pensioners to work longer. Secondly, job in public sector is less stressful and has more permissive working hours than in private sector and that's why can be more appropriate for pensioners. Thirdly, typical public entities are schools, hospitals, universities – entities where the experience matters a lot. Thus, they can be more interested in the employment of the elderly.

This variable takes a value of 1 if company is public or the state is co-owner of the company. The variable has a value of 0 otherwise. The data were taken from the survey's information prior to the retirement year

- Ownership of the company

This variable describes the individual's possession of the company where he/she works. In this study it's suggested that the ownership of the company induce its holder to work further. It can be true because as an owner he/she is interested in the company's business and that's why tries to work as long as possible in order to control it better and to know everything in more detail than it can be achieved without employment. More than that, by continuing to work for own company he/she can ensure that he/she sacrifices with maximum efforts and convince himself/herself that he did everything he/she can in case of negative outcome. Thirdly as an owner of the business he/she can't be forced to leave the company because he/she is the most

important person in the company and that's he/she who makes all major decision. Thus, ownership can guarantee the employment in the company even after the retirement.

This variable takes a value of 1 if particular person is an owner of the company where he/she works and the value of 0 otherwise. The data were taken from the surveys prior to retirement year.

- Job satisfaction

This variable is another job characteristic that can influence significantly the individual's retirement decision. This variable is an answer to the question about the person's satisfaction with his/her job. It's supposed the more satisfaction that the job brings to a particular person the more likely this person decides to continue to work there after the achievement of retirement. And on the contrary, the less satisfaction the person has from the job the most likely that he gives up it.

This variable takes a value of 1 if person fully satisfied with his/her job, the value of 2 if he/she satisfies. It has a value of 3 if person is indifferent with his/her job, the value of 4 if he/she is rather unsatisfied and a value of 5 it he/she totally unsatisfied with his/her job. The data were taken from the waves of survey prior to the retirement year.

- Life satisfaction

In contrast to the previous variable this one describes person's attitude to the life itself. Job satisfaction constitutes only a part of such assessment and therefore can omit important factors that can possibly affect the person decision about work continuation/give up. It's supposed that a person who has more satisfaction with his/her life continues to work further after the retirement, while person with unsatisfied attitude to life will probably give up in attempt to change something in his/her life in order to change his/her attitude to life. Thus, the interpretation of the values taken by this variable is similar to the previous. 1 in case of totally satisfaction, 2 – rather satisfaction, 3 – indifferent, 4 – person is rather unsatisfied, 5 – totally unsatisfied. The data were also taken from the waves of survey prior to retirement.

- Financial situation

This variable emphasizes another side of person's life, its financial aspect. Giving the importance of money and financial well-being in the XXI century, the person's assessment of his/her financial situation can play a significant role in his/her retirement decision. In this study we assumed that the more satisfaction a person has with his/her financial conditions the less likely he/she will continue to work after the achievement of retirement. This hypothesis can be explained by income effect of wealth. There is no need to make efforts to get money because person has already them.

The variable takes value of 1 if person is totally satisfied with his/her financial situation, 2 if he/she is rather satisfied, 3 – neither, 4 – is rather unsatisfied, 5 – is totally unsatisfied. The data for this variable were taken from the waves of survey prior to retirement

- Age of pension payments start

This variable is an age of individual when he/she starts to receive pension benefits. As in Russia there are a number of privileges that allows earlier retirement, the actual retirement age is even smaller than the legally set. Thus, individuals who receives a right on pension payments earlier can have even more possibilities to continue work and therefore younger retirement age should follow with higher rate of decision to continue to work further. However, the persons who hesitated with his/her retirement at his/her legally set age has less chances to continue to work because he/she is already older and most probably has worse health.

The data for this variable were obtained as the difference between the date of the pension payments start and the date of birth reported in the surveys. The values range from 25 (for military pension) to 80 years.

- Planned behavior

This variable stands for the individual planned behavior concerning future retirement. In the RLMS surveys there is a question that inquires about individual's plans concerning a type of behavior after the retirement date. More precisely it allows to understand if the individual regards the pension size as sufficient level of income for his/her life as a pensioner. For example, he/she can count on the continuation of employment and additional income in form of wage in order to provide fully his/her needs. If the person imagine his life after the retirement only with the income that include wage it means that he/she would rather continue to work further. If prior to the retirement the person says that he/she sees his/her retirement as a life with the pension as only source of income, than he/she is predisposed to give up the job. It's assumed that the person's actual retirement decision coincides with his/her planned one.

This variable takes a value of 1 if person plans to live after the retirement on his/her wage together with the pension and a value of 0 otherwise. The data were taken from the surveys prior to the retirement year.

- Crisis

This variable allows to control the possible effects of the world financial crisis on the employment of the elderly. The outcome of the crisis for Russian economy was 7,8% drop of GDP in 2009 and the more than 10% decline in industrial production. In conditions of employment rise, bigger effect more likely concerned the elderly. They are the first candidates who can be fired in the crisis situation. As the retirement decision is not free from the influence of the demand side, some of newly become pensioners could decide rather to retire than to search

for another possible job that in crisis time became more difficult. Moreover, the available positions could be not so attractive concerning wage size and job conditions. So in this study it's assumed that in crisis years the percent of those pensioners who decided to give up their job is higher because of the crisis influence.

Therefore, this variable takes a value of 1 for crisis years 2009 or 2010 and the value of 0 for other years. 2008 we regard as non-crisis year, because the first event that affected Russian financial market was Lehman brother's bankruptcy that occurred in September. The effect of financial market on the real economy was very small and had not yet come out, so we judge 2008 as non-crisis year.

### 3.2 Econometric results

The logit results for the probability to continue to work further after the retirement date (start of pension payments receiving) are presented in the Table 14. The results are given separately for women and men but only for those who started to receive any kind of labor pension, except the "breadwinner type" of labor pension.

Table 14

Logit analysis of the probability to continue to work after the retirement date

| | **men** | | | **women** | | |
|---|---|---|---|---|---|---|
| | Coefficient estimate | Standard error | Odds ratio | Coefficient estimate | Standard error | Odds ratio |
| Intercept | 0,204 | 2,296 | | 30,78*** | 6,12 | |
| Disability | -6,000*** | 1,397 | 0,002 | -4,830*** | 1,160 | 0,008 |
| Heart disease | -1,726** | 0,799 | 0,178 | | | |
| Age of pension payments start | | | | -0,511*** | 0,106 | 0,600 |
| Education level | 0,308 | 0,252 | 1,360 | 0,398** | 0,181 | 1,488 |
| Wage size | 0,025*** | 0,009 | 1,026 | | | |
| Pension size | -0,038** | 0,015 | 0,962 | | | |
| Financial situation | 0,526 | 0,339 | 1,691 | | | |
| Crisis | | | | -0,604 | 0,380 | 0,547 |
| State-owned company | 1,053* | 0,606 | 2,865 | | | |
| Marital status | | | | -0,785* | 0,407 | 0,456 |
| Child's number | 0,231 | 0,424 | 1,260 | -0,414* | 0,239 | 0,661 |
| Planned behavior | -1,797 | 0,631 | 6,029 | -1,237*** | 0,357 | 0,290 |
| Life satisfaction | -0,697** | 0,323 | 0,498 | | | |
| N | 126 | | | 260 | | |
| Preudo-$R^2$ | 0,5124 | | | 0,3812 | | |
| LR chi2 | 80,20 | | | 103,69 | | |
| Prob >chi2 | 0,0000 | | | 0,0000 | | |

*** - p-value<0,01
** - p-value < 0,05
*- p-value < 0,1

In logistic regression analysis an equivalent statistic to R-squared in OLS does not exist. The logit model estimates are maximum likelihood estimates arrived at through an iterative process. They are not calculated to minimize variance; however, to evaluate the goodness-of-fit of logistic models, several pseudo R-square have been developed. These are "pseudo" R-squares because they look like R-squared in the sense that they are on a similar scale, ranging from 0 to 1 (though some pseudo R-square never achieve 0 or 1) with higher values indicating better model fit, but they cannot be interpreted as one would interpret an OLS R-squared.

Stata produces McFadden's pseudo R-squared. According to the regression output, our models are not bad, pseudo $R^2$ are quite high (0,512 and 0,381 respectively for men and women),

especially for men sub-sample. So models have good model fit but we should use another tests because of different nature of pseudo-$R^2$. The likelihood ratio chi-square of 80.2 and 103,7 respectively for women and men with a p-value of less than 0.0001 tells us that our model as a whole fits significantly better than an empty model (a model with no predictors).

The goodness-of-fit measures give also an evidence of quite good estimation results for both sub-samples of men and women (see Table 15,16). By comparing fitted and actual values this measure reports a quite high predictive power of our estimated logit models, 88,1% for men and 85% for women. However, the retirement behavior of men is better predicted than that of women.

Table 15

Goodness-of-fit measure for men

Logistic model for Y

| Classified | True D | True ~D | Total |
|---|---|---|---|
| + | 79 | 9 | 88 |
| - | 6 | 32 | 38 |
| Total | 85 | 41 | 126 |

Classified + if predicted Pr(D) >= .5
True D defined as Y != 0

| | | |
|---|---|---|
| Sensitivity | Pr( +\| D) | 92.94% |
| Specificity | Pr( -\|~D) | 78.05% |
| Positive predictive value | Pr( D\| +) | 89.77% |
| Negative predictive value | Pr(~D\| -) | 84.21% |
| False + rate for true ~D | Pr( +\|~D) | 21.95% |
| False - rate for true D | Pr( -\| D) | 7.06% |
| False + rate for classified + | Pr(~D\| +) | 10.23% |
| False - rate for classified - | Pr( D\| -) | 15.79% |
| Correctly classified | | 88.10% |

Table 16

Goodness-of-fit measure for women

Logistic model for Y

| Classified | True D | True ~D | Total |
|---|---|---|---|
| + | 184 | 27 | 211 |
| - | 12 | 37 | 49 |
| Total | 196 | 64 | 260 |

Classified + if predicted Pr(D) >= .5
True D defined as Y != 0

| | | |
|---|---|---|
| Sensitivity | Pr( +\| D) | 93.88% |
| Specificity | Pr( -\|~D) | 57.81% |
| Positive predictive value | Pr( D\| +) | 87.20% |
| Negative predictive value | Pr(~D\| -) | 75.51% |
| False + rate for true ~D | Pr( +\|~D) | 42.19% |
| False - rate for true D | Pr( -\| D) | 6.12% |
| False + rate for classified + | Pr(~D\| +) | 12.80% |
| False - rate for classified - | Pr( D\| -) | 24.49% |
| Correctly classified | | 85.00% |

Generally speaking, the logit results for the probability to continue to work further after the retirement date are consistent with a priori expectations and previous research (see Table 14).

Nevertheless, obtained results are quite different for men and women. First of all, some factors that are important in explanation of women retirement behavior, don't mean anything in the retirement behavior of men. For example, such factors as marital status or crisis that influence on the retirement behavior of women explain nothing in men retirement decision. On the contrary, such financial variables like the size of wage or pension, person's feeling about his/her financial situation, that matters a lot in the retirement decision of men, have no sense in the explanation of women retirement behavior. The same is true for dummy variable of state presence in a company. Secondly, some factors that significant for women don't have significant influence in the behavior of men. For instance, education level, number of children and planned retirement behavior are significant for women decision while they are not significant for men. Finally, there is factor that affects the retirement behavior of men and women in different ways. This is child number. It reduces the probability of work continuation after the retirement date for women, while increases it for men.

So women and men take into account different factors while deciding about the retirement. Women are more oriented on their social function as a caregiving person. They make decision considering their marital status, number of children and taking into account possible limitations of their choice like economic (crisis situation) and health (disability, age) restriction. Men are more preoccupied with their role in the family as an earner, who should provide family with money, food and so on. That's why determinants of their behavior are the size of pension, the size of wage, the personal judgment about financial situation and life satisfaction that are restricted by their ability to work because of health situation (disability, heart diseases). The common for men and women determinants that explained their retirement decision are education level and planned retirement behavior that can't be treated neither as an incentive to work further, no as limitation to do that.

The most significant difference between those men who continue to work after the retirement and those who give up a job is determined by the presence of state ownership of the company. The odds ratio of work continuation in state company is 2,87 times as large as the odds of work continuation in non-public company. After that the significant differences between odds ratio are observed for level of education, level of satisfaction with financial situation, number of children and planned behavior. However, all these variables are not significant in the modeling of men retirement decision. Among significant ones this is wage size and pension size that matter. 1% increase in relative size of wage lead to 1,03 times higher odds ratio for the probability of work continuation, while 1% increase in relative size of pension resulted in the reduction of odd ratio and thus in the increase of the probability to give a job after the retirement.

As for women, the most significant difference is determined by the level of education. 1 step in education level results in 1,49 times higher odds ratio. So the proportion of those woman who continue to work after the retirement to those woman who give up a job increases by 1,5 with 1-step rise in education level. Others factors diminish such proportion and thus the probability to continue to work after the retirement. The bigger the number of children woman has, the older she is when she starts to receive pension payments or the existence of husband the lower the probability to continue to work is. The factor of having a job in state or not company is not significant for women.

For better understanding of role of different factors in men and women retirement decision, their importance and their significance, let's consider two examples. We estimate the marginal effects of influence of different factors on the retirement decision for a particular person. Firstly we are considering men retirement decision.

For man without heart disease and disability problems satisfied with his financial conditions and his life who obtained average wage size and receives average pension size who has 2 children and completed secondary education who had a job in a non-state company and planned to live during retirement period only with pension payments, the probability to continue to work further is 47,5%. This probability increases with increase in relative size of wage, number of children and education level. 1% increase in relative size of wage increases the probability of work by 0,6%. If men has one more baby, the probability to work further increases by 5,75%. Additional level of education increases the probability by 7,67%. However, relative pension size increase and rise in satisfaction with life decrease the probability to work after the retirement date even further (see Table 17). 1% decrease in relative size of pension reduces the probability of work by 0,95%, while 1-level increase in life satisfaction – by 17,4%!

Table 17

Marginal effects in logit estimation for men

Marginal effects after logit
y = Pr(Y) (predict)
= .47478088

| variable | dy/dx | Std. Err. | z | P>\|z\| | [ 95% C.I. ] | X |
|---|---|---|---|---|---|---|
| heart_~e* | -.3361526 | .13948 | -2.41 | 0.016 | -.609521 -.062784 | 0 |
| disabi~y* | -.4725314 | .18253 | -2.59 | 0.010 | -.830279 -.114784 | 0 |
| wageSIZE | .0063562 | .0024 | 2.64 | 0.008 | .001643 .011069 | 100 |
| ch_num~r | .0575475 | .10595 | 0.54 | 0.587 | -.150115 .26521 | 2 |
| pensio~E | -.0095387 | .00377 | -2.53 | 0.011 | -.016919 -.002159 | 100 |
| educ_l~l | .0767194 | .06272 | 1.22 | 0.221 | -.046202 .199641 | 4 |
| state_~r* | .2466576 | .14002 | 1.76 | 0.078 | -.02777 .521086 | 0 |
| planDE~R* | .3701715 | .14856 | 2.49 | 0.013 | .079001 .661342 | 0 |
| financ~n | .131045 | .08456 | 1.55 | 0.121 | -.034686 .296776 | 2 |
| life_s~n | -.1738792 | .0805 | -2.16 | 0.031 | -.331657 -.016101 | 2 |

For woman that is married and has 2 children, had finished secondary education, that is no disable person and started to receive her pension payments at age of 55 in the non-crisis year and has already planned to live during pension period with only a pension, the probability to continue to work is 55,1%. This probability increases by 10,1% with the level of education and by 26,8% if she has already planned to work after the retirement date. Unmarried women with fewer children have bigger probability to continue to work further, the probability to work for them is 80,6%. However, woman who started to receive their pension benefits at older age or in crisis year have smaller probability to continue to work. The probability to give up a job for them increases by 12% per year of later start of pension benefits receiving and by 11,7% if the retirement occurred in crisis year (see Table 18). Disability reduces significantly the probability to continue to work further for woman in reference case, the probability decreases by 54%!

Table 18

Marginal effects in logit estimation for women

Marginal effects after logit
y = Pr(Y) (predict)
= .55074354

| variable | dy/dx | Std. Err. | z | P>\|z\| | [ 95% C.I. ] | | X |
|---|---|---|---|---|---|---|---|
| disabi~y* | -.5405715 | .08685 | -6.22 | 0.000 | -.710788 | -.370355 | 0 |
| vozrPO~s | -.1201306 | .02522 | -4.76 | 0.000 | -.169562 | -.070699 | 55 |
| educ_l~l | .1012576 | .04628 | 2.19 | 0.029 | .010555 | .191961 | 4 |
| crisis* | -.1167437 | .09532 | -1.22 | 0.221 | -.303563 | .070075 | 0 |
| mar_st~s* | -.157007 | .0914 | -1.72 | 0.086 | -.336139 | .022125 | 1 |
| ch_num~r | -.0987934 | .05924 | -1.67 | 0.095 | -.214905 | .017318 | 2 |
| planDE~R* | .2675589 | .0781 | 3.43 | 0.001 | .114476 | .420642 | 0 |

So government by manipulating with financial incentives and providing possibilities of employment in public sector can affect the men retirement decision to mitigate the effect of global ageing. For example, encouraging the later retirement by financial variables, providing possibilities of public employment and ensuring good medicine levels to reduce health limitations, government can increase the employment of men after the retirement date and thus diminish the problem of labor force shortage, and pension contributions lack. However the different factors are important for influence on women retirement decision. On some of them is very difficult to affect by government policy or this government policy would not correspond with other aims of the government or simply code of conduct. It happens because the factors that increase the probability to continue to work is reduction in the number of children, the earlier provision with pension payments or fact to not to be in marriage. Thus, the influence of the government policy is restricted by good medical service provision, crisis situation prevention and promotion of women education. However, these results are obtained on the observed behavior of war generation, when possibilities and society code don't significantly involve women in education. This situation has considerably changed since those times and so, this propaganda's opportunities are already limited. Nonetheless, some propaganda of the necessity to continue to

work after the legally set retirement date can also have some affect since it's affect women planned behavior and so their retirement decision. Also government should be aware that its policy in other areas could affect the retirement decision in a way that is not beneficial for country. For example, mitigation the consequences of demographic crisis lead to the development of the public policy of stimulating additional birth in each family in Russia. This policy is supported with significant amount of money for the birth of second and third child and that's why has substantial impact on the women behavior. But this policy negatively affects the retirement decision of women (encourage them to give up a job) while encourages men to work further after the retirement and increasing the proportion of youth population. So the retirement policy is quite difficult and the government should take into account different factors from different sides of life that can affect the retirement decision of men and women. And more than that, there are others types of public policy and their development should take into account their possible influence on others aspect of individual's life and thus on other types of public policy.

## Conclusion

This paper presents the result of econometric estimation concerning the probability to continue to work further after the start of pension payments receiving for men and women in Russia. The method of estimation is logit procedure estimation that was implemented for ex-post analysis of the observed retirement behavior of Russian pensioners using a work-leisure model. The data concern a period of time from 2005 to 2010. Actual retirement decisions have been treated as dependent variable and various social, economic and personal characteristics have been regarded as possible determinants of the retirement decision.

Econometric analysis showed that the determinants of the retirement decision are quite different for men and women. In other words they take into account different factors while deciding about the retirement. Women are more oriented on their social function as a caregiving person. They make decision considering their marital status, number of children and taking into account possible limitations of their choice like economic (crisis situation) and health (disability, age) restriction. Men are more preoccupied with their role in the family as an earner, who should provide family with money, food and so on. That's why determinants of their behavior are the size of pension, the size of wage, the personal judgment about financial situation and life satisfaction that are restricted by their ability to work because of health situation (disability, heart diseases). So factors that matters in explanation of women retirement behavior, don't mean anything in the retirement behavior of men and vice versa.

Other factors affect the retirement behavior of men and women in different ways. For example, the variable number of children reduces the probability of work continuation after the retirement date for women, while increases it for men.

The common for men and women determinants that explained their retirement decision are education level and planned retirement behavior that are rather control variable and can't be interpreted neither as an incentive to work further, no as limitation to do that.

So government by manipulating with financial incentives and providing possibilities of employment in public sector can affect the men retirement decision to mitigate the effect of global ageing. To change the retirement behavior of women is more complicated because the factors that increase the probability to continue to work further for women (reduction in the number of children, the earlier provision with pension payments or fact to not to be in marriage) can't be regarded as a desirable outcome of public policy. Thus, the influence of the government policy is restricted by good medical service provision, crisis situation prevention and support of women education. Meanwhile, medical service provision is quite essential for men retirement decision too. Health is regarded as an important limitation for labor activities and that's why weakening the impact of limitation created more possibilities for work continuation.

So this analysis gives first indications for pension reform realization in a way that is more favorable for individuals. It allows for politicians to elaborate appropriate public policy that will accompany pension reform and allow to mitigate the negative impact. This policy should be concerned with the increase in quality of medical service provision, prevention of crisis situation, encouragement of wage size increase and creation of more positions in state companies and entities. However some possible direction of public policy development should take into account different effect that it can exercise on the retirement behavior of men and women. Meanwhile this analysis was performed on the basis of simple work-leisure model and can't be regarded as ultimate truth. Some factors that are more complex concerning the availability of the data as well as computational problems could be not taken into account and thus the obtained results should be interpreted and used with caution. However, the more profound and detail analysis of the retirement behavior of men and women in the Russian Federation is still desired.

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